

Unclassified

VOLUME VI OF 12 VOLUMES

RECORD OF PROCEEDINGS

of a

COURT OF INQUIRY

convened at

U. S. Naval Submarine Base New London  
Groton, Connecticut

and

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire

by order of

Commander in Chief  
U. S. ATLANTIC FLEET

To inquire into the circumstances  
of the loss at sea of

USS THRESHER (SS(N)593)

which occurred on

10 April 1963

Ordered on 10 April 1963

Unclassified

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TWENTY-SEVENTH DAY

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Tuesday, 14 May 1963

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court opened at 0945 hours and announced that this session would be held with closed doors.

All persons connected with the inquiry who were present when the court adjourned were again present in court, with the exception of LCDR Hecker and his counsel. RADM Palmer, the party, and his counsel expressly waived their right to be present at this session of the court.

Captain John B. Guerry, U.S. Navy, a former witness for the court, was recalled as a witness for the court, was reminded that his previous oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, Captain Guerry and classified information can be divulged here.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. When you previously testified before this court, you undertook to obtain certain information for us. Do you have that information now?

A. I do.

Q. The first item of information concerned the furnishing of details as to the employment of a second ultrasonic testing team in THRESHER during her post shakedown availability for the purpose of performing non-destructive tests on her silver-brazed joints made prior to her post shakedown availability. Do you have that information for us now?

A. I do. I found, in checking, that we only used one team. The second team, when used aboard ship, was not in connection with this job order but in other work, so there was only one team assigned to the review of the silver brazed joints, the old joints.

Q. Another question we asked you was whether or not there were reports of progress of the team which was reviewing the old silver brazed joints, and if there were such periodic reports of progress, to whom they were submitted. Can you tell us now?

A. There were such reports. They were furnished by the ship superintendent. A copy came to me; to the Repair Superintendent Captain Heronemus; to the Admiral-- Admiral Palmer--and to the Planning Officer Captain Roseborough.

Q. Do your records indicate how frequently those reports were submitted?

A. Once a week.

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Q. Do you have one of them which you can give us for the court's inspection?  
A. Yes, I do.

Q. Or you can give me the file number if you like.  
A. Here it is.

(A document was then handed by the witness to counsel for the court, and was passed by the court members)

COUNSEL FOR THE COURT: I don't intend to offer it in evidence.

PRESIDENT: I don't think it is needed as an exhibit.

Q. Have you had an opportunity to investigate in a little more detail the possibility of use of strainers in the high pressure air system of THRESHER other than those provided by the Marotta Manufacturing Company for use with their reducing valve?

A. I looked into this, and to the best of the information I can get from any of the shops, only standard screens furnished by Marotta were used; there were none manufactured locally, and I'm sure that the ones installed all came out of spare parts.

Q. In reviewing in your own mind the testimony which you have previously given here, have you found any facts to which you testified which you would like to revise or correct now?

A. Yes, I would. In looking into the dates as to when we started UT, I believe I thought it was in the summer, July--I think that was the date I quoted. I find we started, and got qualified, in March. I also stated I thought the 593 was the first ship we had done any work on. We did do some work on the SKIPJACK, the 585.

Q. Do you have anything else to add?

A. I believe the rest of the testimony as I presented it, I think, is correct.

#### EXAMINATION BY THE COURT

Questions by a court member, RADM Daspit:

Q. Do you have any figures on the results of the testing on the SKIPJACK to indicate what the percentage of bad joints was that you found?

A. Yes, sir.

Q. Can you give them to us please?

A. All right, sir. The job order written called for both a hydro, a visual and, as we got qualified, UT. On the hydro and the visual, 1120 joints were looked at. We rejected 97. Of the 97, we later UT'd 59 of these and of the 59 we UT'd, 29 were rejected as having inadequate bond. In addition we UT'd 116 joints between the hull valve and the backup valve, 24 of which had inadequate bond.

PRESIDENT: Would you say that again, Captain.

WITNESS: 116 between the hull and the backup valve; 24 were found to have bond below the 40 per cent. In addition to this we, on a random basis, got 109 other joints, 18 of which had bond below the 40 per cent.

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Questions by a court member, Captain Osborn:

Q. This examination, to me, represents a far greater examination in the latter phases of an overhaul of SKIPJACK, of which you were not specifically directed to conduct an investigation thereof. How do you explain the completely "unsat" "unsat" performance of these people in terms of the THRESHER PSA?

A. Captain Osborn, I have been asking myself the same question. One of the things accounting for this, when this was done no attempt was made to keep records to identify which joint was which. So we cannot go back and tell you which joints we have done on a joint identification card on the SKIPJACK. It was strictly in doing the job, we had strip lagging; the job order called for strip lagging in the visual. This was done early in the availability when the joints were readily accessible. This job order on the 593 was to be done on a systematic basis identifying the joints by joint, and apparently, I will have to confess, this tripped my people completely as to recording, and they let paperwork bog them down.

Q. Well, in your estimation, in terms of the deal, just looking at the performance, this looks like a fairly extensive examination of the joint problem on the SKIPJACK involving probably about a third of the joints that we're primarily interested in, while on the THRESHER, we're in the neighborhood of below five percent.

A. Well, UT again, if you'll check the UT figure, I quickly added them up-- 284 joints were UT'd versus the 166.

Questions by a court member, RADM Daspit:

Q. You indicated that you had UT'd 116 joints between the hull and the back up valve. I was under the impression that all of those joints were being changed to welded joints? Was this done later--I mean was this change put out later? It was not done?

A. No, sir.

Q. Was any summary of your results furnished to COMSUBLANT or Deputy COMSUBLANT?

A. I am sure it was, sir, but again I'd have to verify that through paperwork as to what was submitted and what was not.

Q. Could you make that available to the counsel for the court?

A. I will, sir.

Questions by a court member, Captain Osborn:

Q. I want to clarify one thing. On the hydro you had 1120 joints; 97 visually rejected, but the whole 1120 were inspected, is that correct?

A. That is correct.

Q. You tore off the lagging and checked those?

A. Yes, sir. There is one other bit of testimony. I said I was not sure on the identification of the material on the 593 but I thought it had been verified. I have since ascertained it was; the material, after the completion of her builder's trial, all material was verified as to being correct material.

PRESIDENT: This was done on THRESHER?

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WITNESS: This was on THRESHER, sir.

Questions by a court member, Captain Hushing:

Q. How was it done?

A. Acid test, magnetic and acid test of the joints in place.

Q. Is there a job order report on this?

A. I'd have to check that. Again this is the word I got from the shipbuilding Superintendent who was here at the time. This was Captain Heronemus.

Q. Did that inspection also include a visual inspection of the joints?

A. I think it did.

Q. Will you get this information and deliver it to counsel?

A. All right, I will.

Questions by a court member, RADM Daspit:

Q. At this time Portsmouth was engaged in developing an impulse test for piping also?

A. That is correct, sir.

Q. Could you give us any idea as to how much of THRESHER piping was subjected to the Portsmouth impulse test after builder's trial?

A. The trim and drain system was the system involved, but I would want to verify again just how much of the system, whether all of the system or just certain sections of it, but it was the trim and drain system to which the test was specifically applied.

Q. And whether any other systems were tested.

A. All right, sir.

Questions by the court president:

Q. Captain Guerry, a quick bit of figuring indicates to me that of the joints on SKIPJACK which were ultrasonically tested, roughly one out of every four failed. Do you recall whether or not this occasion concerned the management of the Yard as to the upcoming THRESHER overhaul and what to do about testing the joints in THRESHER?

A. Admiral, I don't believe it did.

Neither counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

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Edward P. Hamby, Captain, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry, was advised of his rights under Article 31, was duly sworn, and examined as follows:

COUNSEL FOR THE COURT: Captain, this is a closed session of the court and classified information may be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, grade, organization and present duty station.

A. Edward Paul Hamby, Captain, U. S. Navy; present duty station is Force Materiel Officer on the staff of Deputy Commander Submarine Force, Atlantic Fleet.

Q. How do you spell your last name, Captain?

A. H-A-M-B-Y.

Q. Would you briefly describe your naval and professional background and experience?

A. I have been Force Materiel Officer since July 1962. Prior to that for four years I was Planning and Design Officer on the staff of Supervisor of Shipbuilding, Groton. Previous to that, I was Design Superintendent, Philadelphia Naval Shipyard for about four years. Prior to that I was in the Submarine Branch of the Bureau of Ships for about two and a half years. Previous to that I was in post-graduate school in Annapolis and Monterrey. Prior to that--and this goes back to 1947--I was on duty here at the Portsmouth Naval Shipyard for about three and a half years, 1947 to 1950.

Q. As Force Materiel Officer, would you describe your participation in monitoring the progress of THRESHER's post shakedown availability and overhaul work?

A. We rely for information on the progress and status of overhaul work at given time; during the overhaul. We rely upon the commanding officer of the ship to furnish information, and the Shipyard--or in the case of commercial shipyards the Supervisor of Shipbuilding--to furnish us information. There is considerable communication between officers on my staff and myself and the commanding officers of the ships and responsible people in P&E and higher levels in the Shipyard.

Q. Did you have a representative of your immediate office visit the ship and keep informed of its progress by personal observation and consultation?

A. Yes, sir. In the case of THRESHER, Lieutenant Commander Krag, who was on THRESHER when she was lost, was the assistant staff officer directly responsible. He did visit the yard on at least three occasions prior to her going on sea trials. In addition to that Lieutenant Condron, who was his assistant, visited the Yard on one occasion. I personally visited the Shipyard on three occasions during the time the ship was here. And another Assistant Materiel Officer Lieutenant Commander Lowe, visited the Shipyard one time during the THRESHER availability.

Q. Would you very briefly outline the experience of the three officers whom you have mentioned with particular reference to nuclear powered submarines?

A. Lieutenant Commander Krag was an ED officer and he was one of the most outstanding officers I have ever known. He was very brilliant technically. As to his background, he had been on the staff of the Deputy Commander for about two years. Prior to that he was on the staff of Supervisor of Shipbuilding Groton

for two to three years--I can't be sure of the time. Prior to that, he had been on ALBACORE. He was a qualified submarine officer and he had been on ALBACORE. Lieutenant Condron, his assistant whom I mentioned, is a limited duty officer. He had been on the staff somewhat over a year. I am not familiar with his background as thoroughly as Krag's. He had served on board nuclear submarines, I know, before he came to the staff.

Q. Was there a third officer you mentioned?

A. Lieutenant Commander Lowe whom I mentioned, is assistant materiel officer for diesel submarines and his visit up here, primarily, was in connection with diesel submarine work--DOGFISH and ALBACORE. But on the occasion of the visit, he did talk to Lieutenant Commander Harvey the skipper of the THRESHER about the status and condition of THRESHER.

Q. Who was the representative of the Force Commander at the arrival conference when THRESHER arrived here for her post shakedown availability?

A. Lieutenant Commander Krag was the Force Commander's representative at the arrival conference. I personally was here and attended a portion of it in the morning about two or three hours until they went through the authorized work, and work which had not been authorized--had been on the list--and so forth. Lieutenant Commander Krag was the official representative. I monitored part of it myself.

Q. In the case of Captain Harvey and the THRESHER, in addition to the normal means employed by your staff, by the people who worked for you, in checking on the progress of work being performed in the post shakedown availability period of any submarine, was there a special relationship which existed between the people of your office and Captain Harvey?

A. I think the answer is yes. Lieutenant Commander Krag and Captain Harvey lived near each other in New London. They had known each other for a long time. They were very close personal friends. Krag had a very deep interest in THRESHER also, so I would say that from the standpoint of Krag's monitoring THRESHER's work, it was given a good bit more attention than normally we are able to give submarines in overhaul.

Q. How did the Force Commander participate in the preparation of agenda items for THRESHER's sea trials?

A. The Force Commander did not participate in agenda items for THRESHER sea trials.

Q. I am referring to the sea trials at the end of her post shakedown availability.

A. Yes, sir, that is the one I am referring to. The Force Commander did not participate in those. The Force Commander has an instruction out on sea trials, dockside testing, dock trials on submarines after overhaul. This should have provided guidance for the commanding officer to prepare his sea trial schedule.

Q. Did the instruction to which you refer mention only overhauls, or did it also refer to sea trials following post shakedown periods of availability?

A. It does not refer specifically to sea trials following post shakedown periods of availability. It mentions overhauls.

Q. Would you produce it please.

A. Yes, sir. (Hands document to counsel) The instruction I am referring to is COMSUBLANT Instruction 9080.3 dated 5 December 1962.

Q. The subject is "Shipyard Overhaul Dock and Sea Trials", and it does include guidelines for the conduct of deep dives?

A. It furnishes guidelines to the commanding officer for preparing for that, yes, sir.

The cited document was then offered in evidence by counsel for the court. There being no objection it was so received and marked as Exhibit 203.

Q. Now to establish some sort of baseline of the material readiness condition of THRESHER, can you verify that Commander, Portsmouth Naval Shipyard provided a preliminary acceptance trial certificate with regard to the condition of THRESHER?-- There was an inspection and survey preliminary acceptance trial on 24 to 26 July, was there not?

A. Yes, sir. The record shows there was, sir.

Q. Was that report--a report of that inspection--contained in a letter from the president of the Board of Inspection and Survey to the Chief of Naval Operations, dated 11 August 1961, Serial 050?

A. Yes, sir.

Q. It was?

A. Yes, sir.

Q. The certificate from Commander, Portsmouth Naval Shipyard to the president of the Board of Inspection and Survey includes the following does it not? "Certify that the ship machinery and all appurtanences are strong, well constructed and in strict accordance with the contract plans, approved working plans, specifications and authorized changes; and that the work is completed in a good quality throughout, except as noted on certain cards."

A. It does.

Q. Does the Bureau of Ships' endorsement on the report of the Survey Board contain comments on the report?

A. Yes, it does.

Q. The endorsement is dated 19 October 1961, is it not?

A. It is.

Q. The subject is USS THRESHER Preliminary Acceptance Trials and Materiel Inspection Report?

A. Correct.

COUNSEL FOR THE COURT: Mr. President, it is not intended to offer these in evidence, but simply to make our records complete by citing them for future reference.

PRESIDENT: Very well.

Q. Will you cite for us a Bureau of Ships letter noting the result of shock trials of THRESHER?

A. Yes, sir. (Hands document to counsel)

Q. That is a letter from the Chief of Bureau of Ships to an action list which includes Deputy Commander, Submarine Force Atlantic Fleet; Commander, Submarine Force, Pacific Fleet; Chief of the Bureau of Weapons; Commander of the Portsmouth Naval Shipyard; Commander, Mare Island Naval Shipyard; the Supervisor of Shipbuilding at Groton; Camden; and Pascagoula; dated 22 March 1963, Serial 525-075. Is that correct?



A. That is correct.

Q. Captain, were you aware of the BARBEL casualty and the general findings of the Board of Investigation which investigated it?

A. I was aware of the BARBEL casualty. I have very little information on the general findings of the board of investigation. I had not seen the report prior to THRESHER's loss.

Q. We were referring to the investigation of the casualty which indicated a lack of material identification here at the Portsmouth Naval Shipyard and shortcomings in the silver brazing and piping work, is that correct?

A. Yes, sir.

Q. As Force Materiel Officer, what did you do to ascertain the THRESHER's vital piping did not have similar built-in defects?

A. I reviewed the records on THRESHER insofar as our files contained, information on piping systems. I observed a message from Deputy COMSUBLANT to the Bureau of Ships. This is 031916Z of February 1961.

Q. Would you produce it at this point?

A. Yes, sir. (Hands document to counsel)

Counsel for the court then offered the cited document in evidence. There being no objection by the court, it was so received and marked as Exhibit 204. The court waived the reading of the exhibit at this time.

WITNESS: I have no documented evidence to indicate that this inspection was done. However, it was reported to me by Lieutenant Commander Krag; it was reported by Shipyard representatives, and concurred in by the ship's force on THRESHER at the THRESHER arrival conference of PSA that a thorough visual inspection was made by the Shipyard with the system under hydrostatic test pressure.

Q. The problem of silver brazed joints made during the period before the development of an ultrasonic testing capability was one which had to be grappled with by the Force Materiel Officer, was it not?

A. Yes, sir.

Q. Could you trace for us the development of this problem from the aspects of your particular responsibility as Force Materiel Officer?

A. Well, this will have to come principally from the records we have in Deputy Commander's Office. These records may be incomplete because a good bit of this was handled by message and by telephone conversation and by conference reports. However, there is numerous information in the Materiel Office indicating the reports of casualties and requests for action by the Bureau of Ships on silver brazed piping system failures.

Q. Do your files indicate that the Force Commander aggressively pursued the solution to this problem with the Chief of the Bureau of Ships and other interested activities?

A. They most certainly do to a very high degree.

Q. Would you describe the procedures employed for the cross flow of information between your command, the Bureau of Ships, the Shipyard, and the various fleet Commanders?

A. Well, I guess, I'll have to go back a little to the organization of our

staff. I have ten assistant materiel officers. All correspondence that comes in from the Bureau of Ships, from ships, from any source that is related to submarine materiel matters, is routed to those officers. They then use their judgment and prepare action disseminating this information to the fleet, operating forces as necessary, or in the other direction, forwarding it to the Bureau requesting action by the Bureau. This then is presented to me for review and release or for forwarding higher up the line to the logistics officer, my immediate superior. There is also, as I mentioned before, a large amount of telephone communication between the assistant materiel officers and their people of opposite numbers in the naval shipyards, on board the ships, on the tenders of the Force, the squadron commander staffs, the Bureau of Ships Type Desk.

Q. How does the Force Commander get the word about material deficiencies, and other items affecting the safe operation of submarines, to the commanding officers of the submarines who might be interested?

A. If we consider the item involves safe operation, it is routine procedure to send out a message to all SUBLANTS or to all ships of the type or class that may be involved by the particular matter. If safety is not involved and it is a matter of alteration or improvement, or repairs which are not urgent and not associated with safety, then it may be handled by letter; it may be handled by quarterly information bulletins we put out, or it may be handled by a so-called material cross-off list that is put out. I have here samples of all of these types of communications. The court is welcome to look at them and I would be happy for them to be introduced in evidence if this is desired.

PRESIDENT: The court would like to examine a copy of each of those and if you happen to have a copy of your quarterly bulletin which came out in the fall of 1962, we would like to examine it.

WITNESS: I have one, Admiral, dated October, 1962, which is probably the one you are referring to. I am not familiar with the contents of this particular one.

PRESIDENT: That should be fine.

WITNESS: I can provide the one you asked for if that is not it.

The court then examined COMSUBLANT Confidential Information Bulletin dated October 1962, and a sample of each of the other documents to which the witness had alluded.

Q. Captain, what level of confidence would you have in a silver brazed joint, two inches or larger in diameter, in a vital piping system of a deep diving submarine which was made before any ultrasonic testing capability was developed--assuming that it has not been ultrasonically tested?

A. Well, if it had been visually inspected and had been made with the quality control procedures now in effect for silver-brazed piping, I would have a high level of confidence in it.

Q. Assume then that it was made in the period 1958 to 1960.

A. My level of confidence would be lower. If you could still visually inspect it under hydrostatic pressure and it was on an operating ship which had a fair amount of operating time, I would still have a high level of confidence in it.

Q. Would it, however, be suspect in your eyes?

A. It certainly would be now, yes, sir.

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Q. And you would want to have it ultrasonically tested, would you not?  
A. I would.

Q. How do the commanding officers of the submarines in the force have promulgated to them the information which you have just discussed?

A. Well, the Bureau of Ships put out a letter in February, 13 February 1962, recommending visual inspection and certain non-destructive testing for joints two inches and over. That has been issued to the submarine force as a SubLant instruction directing them to maintain records of this inspection for ships that are in PSA or under construction; and for those which have not had the inspection, it directs them to submit a work request for it to be accomplished during their next overhaul.

(b) (6) was relieved as reporter by (b) (6), at this point.

Q. Have you passed to the ships of the Force any preliminary conclusions and lessons which you have derived from the THRESHER loss?

A. Yes, sir, the ships of the Force have been advised of the questionable competence of sil-brazed joints, which was expressed by the court, and the depth of submarines has been restricted by the Force Commander until these questions are cleared up; these and any other questions that may be raised by the court, or from any source in connection with this investigation.

Q. I show you Exhibit (158) before this court. Is this the 13 February letter to which your testimony relates?

A. Yes, it is a copy of that letter.

Q. You have expressed your level of confidence in a certain type of silver brazed joints; how would you compare your level of confidence with respect to a flexible hose in a vital system of a deep diving submarine?

A. Well, all things being equal, if I had seen both connections made, or had inspected them both after they were made, I would have a much higher level of confidence in the silver brazed joint than in the flexible hose.

Q. How would you characterize the number of failures of flexible hoses which come to your attention; would you say that they are relatively few, a moderate number of them, or are they relatively numerous?

A. Well, failures now are moderately few. In the past they were more numerous. We have a very rigid program of inspection and replacement of flexible hose, which has been in effect for some two or three years now, and the hose failures since that time have been reduced considerably.

#### EXAMINATION BY THE COURT

Questions by a member, CAPT Nash:

Q. Captain Hamby, in the course of your present or previous duties, have you had occasion to make an initial deep dive in one of the nuclear submarines?

A. I have made initial dives in SSB(N) submarines; I have not made the initial deep dive in any of those.

Q. I am referring to the testing procedure which was used in going to deep depth; do you recall the sequence of valves or equipment operation that was conducted in the dive when you were present.

A. Well, except for the initial trials, which are generally termed the power plant trials, where they only go to half test depth on a deep diving submarine.

Unclassified

I have not personally experienced this, but they do go through these operations on the initial trials. Of course they go through it more as they go to the maximum test depths. I am familiar with the requirements and the procedures.

Q. I refer to Exhibit (203), the COMSUBLANT Instruction for sea trials; this you presented as evidence to the court a moment ago.

A. Yes, sir.

Q. This instruction appears to me to be more a list of what should be tested rather than how. Are there instructions in existence which would advise the Commanding Officer as to the method in which he should conduct the initial deep dive; specifically, I refer to testing at depth layers as you go down.

A. There was no such instruction in existence for overhaul sea trials, post overhaul sea trials, prior to the THRESHER loss. There are instructions concerning the builder's trials, for new construction submarines.

Questions by a member, CAPT Hushing:

Q. Going back to Lieutenant Commander Krag, what type of ships did he handle on your staff?

A. Lieutenant Commander Krag was responsible for all SS(N) type submarines on the staff; that was his primary duty. He also had additional duties, which I had assigned to him, which were associated with problems common to all nuclear submarines, such as noise reduction problems.

Q. Do you know what duties he had at SUPSHIPS, Groton, prior to his being assigned to the staff?

A. He was Planning and Estimating Officer at SUBSHIPS, Groton, and he was responsible in this capacity for all repair work done under the cognizance of the Supervisor of Shipbuilding on SS(N) type submarines. This also applied to all other submarine repair work done under the Supervisor's second hat as Assistant Industrial Management.

Q. What is your opinion, then, of his experience and background in overhaul and repair of nuclear submarines?

A. In overhaul and repair of nuclear submarines, he probably had more experience and broader experience than any officer I know in the Navy.

Q. I believe you have already testified that he spent a great deal of time with THRESHER; is this correct?

A. Yes, sir; he spent an unusual amount of time; I mean by this, more than we normally are able to spend on a given submarine during overhaul.

Q. Did he at any time indicate to you any question of the safety of the ship so far as materiel was concerned?

A. No, sir, he did not.

Questions by a member, CAPT Osborn:

Q. Captain Hamby, I noticed a large number of materiel letters involving silver brazed joints. These letters appear to me to be categorized in Navy terminology, as "Number Covering" letters. Do you have any specific results directed by those letters that indicate that the conditions in the ship, that the theory of the letters was being carried out?

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A. I'm not sure that I understand your question, Captain Osborn.

Q. Let me take the large number of directives with regard to silver brazed joints to two ships, SKIPJACK and THRESHER. Do you have any results in your hands that the large number of directives in this particular area, that the results as the ships went to sea, had carried out those directives?

A. I do not have documented records in my files to indicate the results of the inspections on the THRESHER and the SKIPJACK, no, sir.

Q. Do you think that it's possible, practically speaking, for an Engineering Officer of a nuclear submarine to set up a program on his own involving some 3300 joints of two inches or above in hazardous systems? To me this indicates that a fellow would have to have a terrific amount of knowledge in joint identification, and it's an exceptionally tough job for a shipyard to do this problem, and I think it's impossible with respect to an Engineering Officer on a submarine. What do you think?

A. You mean for him to inspect and satisfy himself personally that all the joints were good; I think it would take a mighty long time, and I agree with you that it certainly approaches the impossible.

Q. Now, returning to the amount of work that is accomplished on a new type submarine, namely a THRESHER class, or an SSB(N) through a post shakedown availability, do you think that the rules involving going to sea following those trials should be very close to the rules and regulations involving initial builder's trials?

A. For nuclear submarines, the newer and more complicated deep diving ones, yes, sir, I do.

Q. Do you intend, as Force Materiel Officer, to make this recommendation?

A. This recommendation has been made. As a matter of fact, we have submitted a proposed instruction to the Force Commander at Norfolk.

Q. Now what methods did you take in term of overall judgment of the product involved to insure that Commander Krag really was keeping the overall picture with respect to this ship?

A. Commander Krag discussed the problems associated with his responsible area with me very often; probably on the order of twice a day he would talk with me. I knew without question that he was following the ship closely and I had full confidence and faith in his competence and ability to do this. In regard to the ship being ready to go to sea, I personally talked to the Commanding Officer here on Wednesday, 3 April, before she went to sea, and the Commanding Officer assured me that he had no questions or reservations whatsoever about the condition of his ship, or his crew, and that he was ready to go.

Q. This particular observation doesn't protect anyone from having the wrong answer. Do you think we have the real hold on the silver brazed problem within the submarine Force itself, today, what our status is, the conditions of our ships?

A. We do not have this from a standpoint of having non-destructive tests which indicate the conditions of joints. This ultrasonic testing had not been established and certified and accepted by the Bureau of Ships and required by the Bureau until last February. There has not been very much of it done on any ship. It's our feeling that--this is, of course, backside now, but it's our feeling now that the Bureau's recommendations in the 13 February letter, do not go far enough. We have recommended that all joints in sea water systems that are brazed be ultrasonically tested, down to a minimum size that can be ultrasonically tested.

Unclassified

Q. Was it brought to your attention in inter-Force materiel letters between COMSUBPAC and DEPCOMSUBLANT that the whole trim system and sea water system in the SWORDFISH had to be replaced in their availability last year at Mare Island?

A. We do not have in our files, that I have been able to locate, this information.

Questions by a member RADM Daspit:

Q. Referring to Exhibit 158 which is this letter of 13 February 1962, the last sentence in it says "Comments of addressees are invited to insure that time and funds are used in such a manner as to insure the highest possible level of dependability in submarine sea water systems". Can you tell me whether either COMSUBLANT or COMSUBPAC commented on this letter?

A. I have no record of comment, Admiral, except that we did promulgate it to the Force, by COMSUBLANT Instruction, directing commanding officers to request the inspection in their next overhaul, sir.

Q. Referring to the SKIPJACK, did she undergo shock tests approximately a year before the THRESHER underwent shock tests?

A. Yes, sir, she underwent shock tests, I'm not sure of the time, it was about a year.

Q. Referring now to enclosure (1) of the 13 February letter, the Bureau recommended the following procedures: "Visually inspect all sil-brazed joints in sea water systems two inches and over" with some more stuff. In regard to the SKIPJACK, who would have to pay for such an inspection?

A. In regard to the SKIPJACK at that time, the Force Commander, I believe, would have paid for it, sir.

Q. Was this done on SKIPJACK?

A. It was authorized; the shipyard was requested to do it, yes, sir.

Q. Did you get any reports of the results of this inspection?

A. We did not get reports of the results, that I am able to find in my files, Admiral. Lieutenant Commander Krag was also cognizant of this and he did have, I know, a large bundle of our files with him when he went to sea on the THRESHER.

Q. Lieutenant Commander Krag was the cognizant officer on the staff of SKIPJACK, so that if there is any knowledge in the staff, he would have had it?

A. Yes, sir.

Q. We were advised this morning that ultrasonic -- that 1120 joints were inspected visually; that of the number of ultrasonic tests which were made on joints which had been rejected and for other reasons, seventy-one failed out of a total of three hundred and twenty-two on the SKIPJACK. This information had not reached you?

A. No, sir, it had not, Admiral.

Q. Who was paying for the inspection on THRESHER?

A. THRESHER's inspection was being paid for by the Bureau of Ships, while she was still under her construction funds.

Q. You were aware of the decision that was made at the Arrival Conference not to unlag any joints for the purpose of inspecting on the THRESHER?

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A. For the purpose of inspecting only -- yes, sir, except the joints between the hull and the backup valve, including the backup valve. It was our understanding that the Arrival Conference agreement required that they be inspected if it was possible without removing major machinery or equipment in the ship.

Q. Another subject. Isn't each submarine in the Force now required to make up an individual item list of every flexible hose on board, to maintain a record of it, and to change it after such and such a date?

A. Yes, sir.

Q. This is in line with what they might be required to do on sil-brazed joints; I mean it would be work of the same nature.

A. Well, yes, sir, except there's a tremendous difference in the magnitude of it, Admiral. I'm not sure that this would be possible for the ships themselves to do so.

Q. Can you tell me how the number of flexible hoses and the number of sil-brazed joints compare on THRESHER?

A. I could only speculate, Admiral; I would guess that a factor of at least a hundred involved to sil-brazed joints to flexible hoses.

Questions by the President:

Q. Captain Hamby, you said, I believe, that you would have a high degree of confidence in a sil-brazed joint which had been made between 1958 and '60, which passed a good visual inspection.

A. Yes, sir.

Q. Now, can you inspect a joint properly that is lagged?

A. No, sir.

Q. Did the decision at the Arrival Conference on THRESHER not to unlag for inspection of joints, cause you any concern?

A. No, sir. At that time we were of the impression that THRESHER's joints had been inspected prior to delivery after the BARBEL incident, in the very same manner that the Bureau Instruction calls for. Also, there had been a precedent set, Admiral; I think lagging had been discussed, removal of lagging had been discussed on previous ships, and it had been decided that removal of lagging was too large an undertaking on ships which had been through cycling at depth and had operated for some appreciable period of time, and that only those joints which were exposed in connection with other work, plus all of those between the hull and the backup valve, would be mandatory for inspection.

Q. Can you explain why COMSUBLANT spent the money to have the lagging removed and some 1400 joints inspected on SKIPJACK, and then didn't insist upon a report of what was found?

A. Normally, Admiral, we do not require reports of results, or do not get reports unless there is significant trouble or defects found. Then we do expect reports immediately. Otherwise we do not get reports until after the ship overhaul has been completed, and the only report we get then is the formal report that the shipyard, the Supervisor, sends to the Bureau on completion of overhaul, so this is normal procedure.

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Q. Who was your Force Materiel Officer representative in the case of the SKIPJACK overhaul?

A. Lieutenant Commander Krag, sir.

Q. Do you consider one out of every four joints ultrasonically tested failing as a significant matter that should be reported to you?

A. Yes, sir.

Q. Was it ever reported to you that one-fourth of the joints ultrasonically tested in SKIPJACK failed?

A. No, sir.

Questions by a member, CAPT Osborn:

Q. With respect to your previous experience at SUPSHIPS, Groton, would you describe for us the silver brazed process and control of the work that was done by the Electric Boat Division while you were at SUBSHIPS immediately subsequent to the completion of the SKIPJACK?

A. I don't think I can answer that question, Captain Osborn. I was not Inspection Officer there. I know that there was a change in procedures.

Q. I'm not interested in the specifics, Captain Hamby, I'm interested in the activity in the yard, was it a high priority, a low priority or a normal, with respect to the silver brazed process itself.

A. I think it was normal.

Neither the counsel for the court, nor the court wished to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was cautioned concerning his testimony and withdrew from the courtroom.

The court recessed at 1115 hours, 14 May 1963.

The court opened at 1150 hours, 14 May 1963.

All persons connected with the inquiry who were present when the court recessed are again present in the court.

Captain Clarence J. Zurcher, U.S. Navy, a former witness, was recalled as a witness for the court, was informed that his previous oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, Captain Zurcher, and classified information may be divulged here.



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DIRECT EXAMINATION

Q. For ease of reference in the record, please state your duty station.

A. I am presently the Assistant Chief of Staff for Logistics for the Deputy Commander Submarine Force, Atlantic.

Q. Please review your professional and naval background and experience.

A. My naval background has been primarily in submarines. I spent two and a half years in destroyers prior to entering the submarine service. My duties, other than submarine duty, have been CINCPAC Fleet Staff, Bureau of Naval Personnel, Post Graduate School and the National War College. Just prior to being ordered to my present assignment, I was COMSUBDEVGRP/TWO.

Q. For how long were you Commander Submarine Development Group TWO?

A. For two years, from July of 1960 to July of 1962.

Q. During that tour of duty were you operational commander of THRESHER?

A. Yes, I was; I had THRESHER for pre-commissioning training, until she went into commission in August of 1961, and I was then her operational commander for the rest of my tour, and this of course included sea trials prior to commissioning.

Q. Will you describe the personnel situation in THRESHER, her state of training and readiness during the time she was under your command, and until she commenced the post shakedown period of availability?

A. The personnel situation was about as follows: The Commanding Officer, Commander Axene, he was an officer who had a lot of submarine experience; he had had a prior command. I couldn't have been happier with anyone who could possibly have been assigned to the ship as Commanding Officer. The rest of the officers in the wardroom were all highly capable, and we had absolutely no problem with any operation or pre-commissioning exercises that we ran through. The crew was likewise a fine outfit. They had a high esprit de corps, and in such things as their admin. inspections they were outstanding. You could have photographed any one of them for a recruiting poster. The professional competence of all these people was outstandingly good throughout. There were absolutely no problems with any of them. Between TULLIBEE and THRESHER, they were a fine hand-picked lot from the last seamen aboard right through the Skippers.

Q. Coming back now to your present duties as Logistic Officer, Captain Zurcher, at the time of THRESHER's period of post shakedown availability, did you know about the Board of Investigation into a casualty in BARBEL's piping system?

A. Yes, I did. I became aware of this during THRESHER's pre-commissioning phase, and during the fitting-out period right here in Portsmouth. I had made many visits to THRESHER and on one of those occasions BARBEL had just arrived, and I made it a point to go over there and to check into what all the problems amounted to. The Skipper of THRESHER was likewise concerned about this and expressed it at that time. We were quite well satisfied at that time that Portsmouth made a real effort to check into THRESHER's piping system throughout with all the assistance and technical techniques that they knew then, which consisted mainly of a lot of visual inspections and hydrostatic inspections, and when they got finished we were pretty confident that the piping system on THRESHER, as referred to the sil-brazed problem, was good.

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Q. At the time of the BARBEL investigation, what percentage of completion existed in THRESHER's piping system?

A. I don't think I can give you an accurate answer on that; it was not a hundred percent complete, but it was a long way towards finished, and there was much testing that went on after with a mallet and hydraulic tests, and this was of a lot of concern here in the Yard at that time. I would say that the bulk of it was already installed.

Q. We have heard that it was about 80% completed at that time; would you quarrel with that figure?

A. I was going to say 90%, but I would not quarrel with 80%; that sounds correct.

Q. Do you know if the inspections, and testing of her piping systems after the BARBEL investigation consisted of unlagging of joints?

A. There was a certain amount of unlagging; I could not testify as to what extent they unlagged the joints. Here again, when they did finish and getting the reports that I got at the time and taking a look at what was going on, and talking to the Skipper and the Chief Engineer and others, I was reasonably well satisfied in my mind that the Skipper was on firm ground in going to sea with it at that time. I think you are probably all familiar with the fact that there was one fitting that gave way during the initial sea trials while we were out there at that time, but that was a fairly small sil-brazed joint; nothing large.

Q. I show you Exhibit 182 before this court, a letter from Commander Submarine Force, Atlantic Fleet to Portsmouth Naval Shipyard, dated 7 September 1962; did you sign that letter as the originator?

A. Yes, I did.

Q. Would you explain the factors which governed you in addressing that letter?

A. This is a correction to a Portsmouth letter which is reference (a), and in which they omitted the underlined part of the letter in paragraph 2(a). Portsmouth had, prior to this, written a letter on the 9th of May -- I think you have this letter here --

Q. The 9th of May letter to which you refer is Exhibit 156; is it not, as you glance at Exhibit 156?

A. Yes. Portsmouth had advised then, and in reference (a) of 9 August, that they felt so confident in the work that they had done, checking over all the sil-brazed joints, that they didn't need to do a complete hundred percent unlagging job. We couldn't quite take reference (a) at face value, because we felt regardless of what advice they had given on the quality of the work, that we didn't feel that they should do anything except unlag, as a very minimum the part between the hull and the backup valve which is so critical, so first of all we insisted that that be done. That was the intent here of this letter, to make sure that they checked everything visually and with ultrasonic testing all that between the hull and the backup valve that they could get to without removing the main machinery and hull foundation.

Q. Then in Exhibit 182 you reminded them that you insisted that the piping between the hull and backup valve be ultrasonically tested; is that correct?

A. Yes. There's a little more background than that, also. I had been on THRESHER many times, the many evolutions to test depth and operational readiness inspection, and so on, and after seeing what Portsmouth did initially on the

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pipng, the quality of work, I was reasonably satisfied that they would do a good job with the test that they were going to give. One of the things that they were going to do after shock test was to take all suspect joints in the piping that was loose, not lagged, and give them a thorough going over; this was all in addition to that. Another factor that entered into this thing was that during the shock hardening period of THRESHER at Electric Boat, they checked somewhere in the neighborhood of 130 to 140 joints, and they only found two that were really bad. There were about six that were suspect, and those they didn't replace, because they were marginal with 40% bonding criteria that was set up then, but they went on shock trials, and all those that EB had cleared stood up under shock well. I never did find out what happened to the six; so far as I know they did not give any trouble in the shock trials. The record of the shock trials indicated that THRESHER was in much better shape for the same shock factor than SKIPJACK was, in that she did not have as many joints fail in this period. This was another factor that led me to believe that Portsmouth had in fact done a good job throughout. The Skipper -- we were all pleased with the results of the shock test, because we expected a larger number of failures of different pipes in the ship.

Q. But your letter of 7 September, Exhibit 182, was, in effect, a request, an insistence really, on the requirement that there be ultrasonic testing of all joints between and including the hull valve and the backup valve; is that correct?

A. That is correct, except those involving major removal, unless those were suspect for any reason under visual inspection.

(b) (6) relieved (b) (6) as reporter at this point.

A. (Continued) And there were many telephone calls on this subject, and I think Reference (b) is one telephone call on this subject, which were made in an effort to iron out the understanding we had concerning this subject with the Bureau, and Portsmouth Naval Shipyard.

Q. Now, I show you Exhibit 115 before this court, a letter from the Chief, Bureau of Ships, to Commander, Portsmouth Naval Shipyard dated 28 August 1962, Subject: "U.S.S. THRESHER silver-brazed piping." The letter itself indicates that a copy went to Deputy Commander, Submarine Force, U. S. Atlantic Fleet. Are you familiar with this letter?

A. Yes, I am.

Q. A portion of a paragraph in this letter with reference to THRESHER reads as follows: "To this end, Portsmouth Naval Shipyard is directed to initiate the following actions during THRESHER's PSA: (a) Employ a minimum of at least one ultrasonic test team throughout the entire assigned PSA to examine, insofar as possible, the maximum number of sil-braze joints..." Will you explain why, in your letter of 7 September 1962, you limited your insistence on the extent of inspection of those silver-brazed joints between the back-up valve into the hull?

A. The two letters were in fact not related. That letter we got several days after the letter from DEPSUBLANT went out of Headquarters, and again, it was the intent of our letter to add additional work to what Portsmouth specified they were going to do and not to downgrade anything the Bureau of Ships had said. The Bureau had our letter also. Regarding the intent of this, it is interesting to note that in the SKIPJACK shock tests, which we believed we had more casualties on, the SKIPJACK also was not completely unlagged in fitting her out again for

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sea. The 608, 609, 610 and 611 followed the intent of that BUSHIPS Instruction and didn't call really for executing 100 percent of unlagging. As a matter of fact, the Bureau of Ships at one time told AIM, Groton, that this was not necessary or required.

Q. What does "AIM", Groton" mean?

A. Assistant Industrial Manager, Groton.

Q. During SKIPJACK's recent overhaul, were you aware of the fact that ultrasonic testing of her silver-brazed joints was accomplished at Portsmouth?

A. I was.

Q. Did you get a report on the extent of the tests performed and the results of those tests?

A. No, I did not. Ultrasonic testing is something fairly new, and in going through all the letters from the Bureau and from Portsmouth, it is evident they were trying to achieve going through and qualifying all systems. Ultrasonic testing is one scheme that has not been implemented fully by all Naval Shipyards by any means. Portsmouth just recently got into the business. I doubt that on SKIPJACK they did very much ultrasonic testing.

Q. Captain Zurcher, as the Force Logistics Officer, would you not have been interested to ascertain what the results of the SKIPJACK surveillance was?

A. Yes. I would have been interested, and I was interested, but I can't recall just what the nature of the ultrasonic testing was on SKIPJACK. Again, from recollection, there was very little done, it was sampling for the most part, and nothing significant which would indicate a precedent had been set for procedures in performing ultrasonic testing of sil-braze joints.

Q. It is possible that no formal report of the results of that ultrasonic testing ever reached you, is it not?

A. This is correct. I don't think we ever got a formal report. I got this information by other means, by talking to people in this area.

Q. Could you explain to us then how, as the Force Logistics Officer, you do insert yourself in the cross-flow of information about your ships which flows amongst the Bureau of Ships, the Shipyards, and your own fleet staff?

A. Yes. We definitely insert our own ideas and thoughts in here. We are interested primarily in monitoring what goes on with the ships in the yard. We are interested, of course, in recognizing the capability of our submarines design-wise and other alterations that are accomplished while the ships are in the yard. We are also very conscious of anything that goes on relating to the safety of operation of our submarines. We are always on the lookout for that sort of thing. We do keep close tabs on what the yard is doing when a particular submarine is in.

Q. But the "close tabs" in the case of the testing of SKIPJACK's joints by ultrasonic methods resulted from your relying upon the Shipyard to notify you if anything of real significance was uncovered. Is this a fair statement?

A. This is a fair statement. We have to rely on the technical advice from the technical bureau and from the Shipyard, and unless we get that word, we lack sufficient information. As an example, we have recently, last October, indicated to the Bureau of Ships that we wanted to be informed of the items that related to operational safety in sea trials, and so on. This is because, in reading our report, we suddenly discovered there had been a waiver granted of some radiography

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in the torpedo tube level in one of our submarines. The Bureau replied they would let us know in the future when something affecting operational safety was developed. We told them we wanted to be kept informed of the results after a ship went to sea, and that we wanted to monitor this very closely. I believe we have reached a good understanding with them now that will allow a good cross-flow of information between the Bureau, the supervisor of the overhaul, and the Ships' Force Commander, so that all of us will be cut in at all times on those things affecting the operation safety of our submarines.

Q. What means do you employ to insure that items affecting operational safety which you do hear about are passed to the Commanding Officers of your submarines and their immediate command?

A. We are very conscious of getting word to the commanding officers of submarines on matters affecting material, and one of the most effective means is to readdress the messages we receive on this type of information to all submarines. We have quarterly bulletins. We have material bulletins. Any time anything comes up that a submarine at sea, or any place else, should know about, we see that they get the word. A Material Shop is broken down into different areas to handle specific information, and they are prepared to watch for these areas where we don't have cross connections going to the proper areas.

Q. How did the information from the lessons learned from the BARBEL investigation get to your operational people who needed to know; to wit, the commanding officers and their immediate commanders?

A. I don't think that I can answer that precisely. This happened somewhat before my time, but I think that there is no question that everybody in the Submarine Force heard about this in pretty fast fashion and that everybody got the word on the sil-braze failure. But I can't recollect now what officially took place to inform them of this.

Q. Turning now to THRESHER's period of post shakedown availability, would you explain the participation of yourself and those in your office in monitoring, supervising, and assisting, as required, in the work that was performed in THRESHER during that period?

A. I think that THRESHER probably got more monitoring and supervision than any other submarine in recent times. I had a particular interest in her, having been around her so long, and I was very curious and conscious about things that were going on. She was a great ASW vehicle that we had learned so much from and had made so many innovations sonar-wise and so forth, to give her greater capabilities. She was a vessel that attracted a lot of attention, and I think she got the focus of more attention than the average. There were many times when one officer from the Materiel Shop had been on THRESHER to discuss things with the Shipyard people and with the Commanding Officer and others on board THRESHER. On a few occasions one of the officers went down to New London and ironed out some of their problems down there. During the last two weeks prior to sailing, we focused even more than the usual amount of attention on her. There were three people who had considerable contact in that regard before and during the fast cruise. Lieutenant Commander Lowe was up here about ten days before she sailed. He called me on a couple of minor items. The next day Captain Hamby went up there and squared those away. I talked to the Skipper about this personally on the phone to see if he had any problems that would preclude his going to sea with a view toward getting him additional time at the last minute if he felt he needed it. And then, of course, Lieutenant Commander Krag from our staff rode the ship. We always have a materiel officer riding out on the sea trials to keep thoroughly

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posted on what the progress is on these ships, and how our people feel about what is going on in the material field with the Shipyard and for our own education and edification also.

Q. Did your interest in THRESHER during her post shakedown period of availability extend to your informing yourself as to the extent of the ultrasonic surveillance of her old silver-brazed joints and the results of those tests?

A. We never got a complete report from Portsmouth of the ultrasonic testing or the results of it. This is still in the forming up stage as near as I can tell, and we never got the results. Our people in the Materiel Shop had been monitoring this, like they had in a lot of other areas, and this was one of the many areas we checked on as a matter of routine, to see that progress was satisfactorily made during the PSA. My best source of information toward the latter part of the availability was with the skipper. I had known him a long time. I felt we were getting, all in all, good accurate information from all sources.

Q. But you did not have the figures on the results of the ultrasonic testing of her old joints, did you?

A. We did not have those figures.

Q. From the point of view of the Force Logistics Officer, would you tell us whether there was any pressure on you to get THRESHER's post shakedown availability finished and get her back in operational status again?

A. I don't think there was anything that you could say was pressure. You had the normal desire to get the ship out operating. There were many delays - and for good reasons - that occurred. When I talked to the skipper the last time, we were concerned about several jobs, all of a non-safety type of thing, and the net result of this, when he came back from sea trials, is that they would have had to work on them during the ready-for-sea period. I told him that we had to take into account the schedule and extend one extra week so that he could take care of these items.

Q. When did you have that conversation?

A. About a week before sailing. It was obvious they could not conduct the sea trials and the ready-for-sea period in that period of time.

Q. What was the nature of the items which he was concerned about at that time?

A. Painting items; there was some lagging that had to be done; some work on the torpedo handling gear that had to be done - a lot of items on that type internally that would have taken roughly another week.

Q. Was there anything that even remotely concerned the safety of the ship?

A. Negative, nothing in that area, nothing that we can even sit back and extrapolate could possibly affect the safety of the ship.

Q. Did you get the impression in your discussions that he felt the pressure of the calendar to get his ship out to such an extent that he might have skimmed on something which had to be done which could possibly affect the safety of the ship?

A. I don't really think so. He was a young lad, an eager skipper with his first command. He was eager to get to sea. However, I did not get the impression that he had overlooked anything related to safety items that would

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jeopardize the ship.

Q. Was that true also with respect to the sea trials he was proposing to conduct?

A. The sea trial results, I saw them after the fact. We don't normally get the sea trial overhauls in Headquarters. But in looking them over, they were all of a conservative nature. There was nothing significant about them. We have a Force Instruction that lays out the minimum requirements for conducting sea trials, and looking over the results after the fact, it looked like they were well complied with and nothing that could be interpreted as possibly jeopardizing the safety of the ship.

Q. I show you Exhibit 203 before this court, COMSUBLANT INSTRUCTION 9080.3, entitled "Shipyard Overhaul; Dock and Sea Trials." Is that the instruction to which you referred?

A. Yes, that is the instruction to which I referred.

Q. Is there anything in there which would govern the requirements for conducting sea trials after a period of post shakedown availability?

A. The sea trials that governed here were for the Shipyard overhaul, but it is not labeled specifically "Post Shakedown Availability." This is the instruction he would have been operating under.

Q. "Would have been," but did you give him any instruction and guidance in the formulation of his plans for conducting sea trials?

A. We didn't give him any specific guidance or planning factors in the thing. If he didn't use this, he would have had to go to the Squadron Commander to get additional instructions, according to the regulations contained in here.

Q. In retrospect, do you think it would be desirable to make those instructions more specifically applicable to sea trials after a substantial post shakedown period of availability?

A. Yes, I think it would be a good idea to include the PSA requirements if it is going to cause any misconception. However, I can't feature that it would.

Q. Do you feel that the instructions regarding sea trials could be more fully set out?

A. This is a skeleton framework on which we're operating. We are looking them over with the idea of putting them all in one instruction with different enclosures, and we have found nothing in here during this particular review that indicates there should be any great modification of this, but we are still working on that with an idea of possibly improving on it.

Q. In the last analysis, Captain Zurcher, with reference to sea trials conducted at the end of a post shakedown availability, is the formulation of the agenda left strictly to the Commanding Officer of the ship?

A. The formulation is left to the Commanding Officer of the ship to insure, with the Shipyard, compliance with the instructions, and if he deviates from this, to go through the Squadron Commander. That is the framework on which we are operating.

EXAMINATION BY THE COURT

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Questions by a court member, CAPT Nash:

Q. Captain Zurcher, is it not necessary for the Commanding Officer to have his sea trial agenda approved by the Squadron Commander?

A. It is not necessary to have it approved by the Squadron Commander unless he deviates from this instruction. If he did, then he should have gone through the Squadron. The Squadron, I believe, had a copy of this.

Q. Captain Zurcher, in your discussion with the Commanding Officer did you receive any indication that he was aware of the results of the ultrasonic testing in SKIPJACK or in THRESHER?

A. We discussed many things. I can't answer specifically whether he was aware of that or not. I feel that he was aware in a general way of the SKIPJACK problem, because this was one of the things that went on when he was in TULLIBEE, and this was general knowledge at that time. While I was up here in THRESHER I can't say whether he actually knew about SKIPJACK's results or not. He certainly had access to them up here in the Yard, I believe.

Questions by a court member, CAPT Osborn:

Q. Have you had any occasion as Force Materiel Officer to look over the Portsmouth Naval Shipyard's performance with respect to silver-brazed joints in ships of recent vintage, such as BARBEL, SWORDFISH, SEADRAGON, THRESHER?

A. Their performance in performing sil-brazing work on those ships?

Q. Yes.

A. During a period when BARBEL was up here I did observe some of this, and it was my belief at the time that Portsmouth was doing a good job on those joints that they were making in the shop. And the field joints, those installed on the ship, it looked like they were doing a good job, too. There was more focus of attention on those joints because of the BARBEL here in the Yard. It was my belief, from the results of the testing, that they were making good joints, and in addition, when they made a good joint, it was as good as a welded joint, in that the pipe would rupture before the joint would give.

Q. Do you believe that now?

A. I believe if a joint is made properly, and it is a good joint, it is as good as a welded joint, if it is found on testing to be a good joint.

Q. If you don't test them, how do you know it is made properly?

A. You don't, unless you run a test on them. I think that the area we are getting into now will probably insure that these joints are properly tested. In the current thinking, if we continue in this direction, we can be sure of getting a good UT test on all joints. They are looking in BUSHIPS toward some scheme that will insure that all of these joints are UT tested.

Q. What would you do as leading Materiel Officer in the COMSUBLANT chain? What would you recommend?

A. Now?

Q. Yes.

A. I would recommend, as we have already recommended, that everything from one-half inch and above be UT'd completely throughout all the ships before they go back to test depths. That's what Admiral Ramage has recommended to BUSHIPS.



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This is quite a monumental job, and it will take a long time. Any ships in PSA, such as the JEFFERSON, about to come out, it is going to extent their period of availability for some time. We are faced with the problem of the availability of the personnel as well as the devices used in ultrasonic testing.

Q. We're having a tough time extending our ultrasonic techniques to one and a half inch. With that low a diameter, do you think it is practical to impose something on the state of the art at the present time which is impractical?

A. We went down to a conference in BUSHIPS on Friday, and our approach at that time was directed towards testing 1-inch, and that was what Admiral Ramage recommended during the meeting, but the Bureau of Ships representatives said they want to cut it down to half-inch. They cannot possibly test all half-inch now, but that is what they are going to strive for. They cannot even do it properly now at the 1-inch level.

Q. Realizing that the material condition of the ships is intimately associated with operational procedures and the advance state of readiness on the ship with respect to flooding casualties, what measures have you instituted for improving operational procedures on a ship?

A. Just recently?

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Q. Yes.

A. Of course, the main thing we have done to put us on safer ground, to begin with, is reduce the test depths of these 700 and below boats. We have sent out a message to all operating forces to reverse the leads on the air flasks so that we will carry three failing open and one failing shut. No. 3 bank will fail shut and three will go to the header. We have indicated we wanted the additional volume for air blow and the emergency air blow as a minimum. In the FBM we want to cross-connect by power valve on an emergency basis, if necessary. Those are some of the areas of concern. The other areas of concern are sil-braze joints, flex hoses, and recovery capability.

Q. Have you discussed any conversation that you had with Commander Axene or his officers on the ship with respect to control of flooding casualties?

A. We discussed this many times during initial sea trials. We had a meeting on the barge until about 2:00 o'clock on the morning that we sailed at 6:00, including the cycling of valves during sea trials and what would happen if we flooded any one area from 700 feet down, and we actually cycled every sea valve. It took about two and a half hours to run through the fast series. We discussed these areas of what we would do, and getting back to the pump speed, it was determined at that time that we were all for having them in high, because we knew air was very questionable and how much good it would do at that depth.

Q. What personalities were involved while you were going through that fast drill?

A. There were several personalities involved on the barge: Admiral Moore, Admiral Rickover, Admiral Palmer, the skipper, and myself, and about four other people.

Q. Were you surprised when you went through that procedure as to how smooth it went or how rough it went? Did two and a half hours seem a long time?

A. I thought it went pretty fast. We got it down to a shorter period of time after that, but not having done it before, it took a lot of our time, because in order to start one sequence of the operation, you had to make sure the other one was all buttoned up. So I think that we did it pretty quickly considering it was the first try.

Q. Did you consider that would be a pretty good procedure coming out of a PSA when all ball valves and actuators had been removed?

A. I couldn't quarrel with the procedure, particularly with a deep boat like that.

Q. Did you go into detail with respect to the actions you would take in the event of flooding casualties - not trying to shut every valve on the ship, but immediately isolating the system?

A. Negative. The main recourse we had to any serious flooding casualty was a large up angle and as much power as you could supply to the screws. We discussed what we could do with air. That is the vein that we discussed - the recovery possibilities on the ship.

Q. If you suffered a big flooding casualty right now, would you recommend as large an up angle as you could get?

A. I don't mean as large as you could get.

Unclassified

Q. What is a "large" up angle then?

A. Twenty or twenty-five degrees. For that ship it could be 30 degrees. Thirty degrees for that ship was not unusual. If you accelerate the up angle by applying air to the tanks and flooding aft, you could get into trouble, of course.

Q. Did you instruct your people to keep the ship flat when they have a flooding casualty?

A. I never personally gave that instruction, but we discussed it many times as a good procedure. This was recognized as a good technique. I never gave any of the skippers specific instructions as to how to cope with any specific casualty. They would have to pretty much handle it on the scene, depending on the circumstances.

Q. Looking back to the preparation of instructions at Deputy COMSUBLANT headquarters and the homework that you necessarily do, what tools did you have available to you with respect to flooding rates, sinking rates, blowing times, that you would consider essential on a damage control study of any kind?

A. I think we have all the necessary tools. We have the Electric Boat Company there as a good supplier of that information. I think we have everything that we need to make an analysis of this type of thing.

Q. Did you have them on 10 April?

A. We had some of them on 10 April. We got a lot more after that. We had the curve to show what effect so much water will have at a given speed and how much effect your reserve ballast will do for you. We had seen these curves before. THRESHER had a copy at one time, or something very similar. And since that time we've had a more refined set of curves on some of the studies that have been done at the Electric Boat Company.

Q. Are you sure, from looking at those curves in terms of isolation and training in broad general principles, that you're on firm ground in the Submarine Force itself?

A. I wouldn't say we were absolutely sure that we are on firm ground for operational and training procedures. This is something that will have to be studied for a long time. I'm not convinced that we necessarily have everything nailed shut on this problem.

Q. Have you got anything nailed shut?

A. Well, I don't know just what you mean.

Q. Name one thing on which you have specific controls in terms of flooding casualties.

A. It depends on the flooding casualty. I'm inclined to think that when you get a big flooding casualty, you make an effort to stop the flooding casualty as soon as possible, even if it means shutting down the power plant. But you're speaking of something -- You're getting into the training area here, and I can't speak to that currently really.

Q. Had you ever discussed a main circulating, main water casualty with respect to the main condenser?

A. Yes. This sort of thing had been discussed, particularly on TULLIBEE. What do you have reference to?

Unclassified

Q. Well, I was interested about your particular feeling in terms of shutting the main circulating system.

A. I think there was no difference between the THRESHER or the TULLIBEE, that they would avoid shutting that only as a last resort.

Q. How about the ASW system?

A. There again, I think that you would have to weigh what you are going to lose against what you are going to gain.

Q. If you shut those systems, what would you lose?

A. If you shut the main circulating --

Q. No, the ASW system.

A. How are you rigged?

Q. I'm rigged b(3) 10 USC 130

A. You can shut them and you could lose power b(3) 10 USC 130

Q. Had you ever had any discussion with anyone with respect to how long you would lose power and how long you could keep power on the ship?

A. Yes. You could keep power if you run pumps in slow speed for something on the order of b(3) 10 USC 130 If you're running on high speed, you would probably lose power b(3) 10 USC 130

Q. Did you have this information before the THRESHER casualty?

A. I don't think we had it precisely as we have gone through it now. We had it in a general way, and again, this feeling has been mine, as discussed with most skippers, that we should run those pumps in high speed because we wanted maximum amount of power down at deep submergence.

Q. Do you consider maximum amount of power a big difference between b(1)

A. Well, I think that you could make a good case where you don't gain anything for a little while, but I would prefer to have the maximum power if I could get it, and not lose anything else. We have not resolved this yet. We have asked BUSHIPS, over a week ago, to give us a recommendation, and they have not said anything yet.

Q. What do you think of the constant vent system?

A. What do I think of it?

Q. Do you think it is a necessary system on board? Have you discussed it with BUSHIPS, or do you think it is really necessary?

A. I can't recall that I discussed it with BUSHIPS, no.

Questions by a court member, RADM Daspit:

Q. Captain Zurcher, referring to the ultrasonic tests of small piping, do you consider that specifications should be something that the workman should meet or merely a goal toward which he should strive? In other words, if we prescribe ultrasonic tests for half-inch piping and we can't do this, how does the workman at the yard know what he is supposed to do?

A. I don't think that we have prescribed this to anybody yet, Admiral. I believe that if the Bureau of Ships can assure us that they can give us satisfactory UT down to half-inch, they will issue the proper instruction to the yard to go

Unclassified

ahead and do it. We have not made this a specific requirement on any Shipyard. We have asked the Bureau of Ships to do this if it is technically feasible. We thought 1-inch would be more practical at this time. They think it is feasible to do it to half-inch.

Q. I might point out, if the Bureau follows its past procedures, they will merely recommend to you what procedures to follow; they will not require them. I recommend that you carefully look at what you can require the Yard to do and insist that they do what you tell them to do. Referring to Exhibit 203, which I think you have in front of you -- this is the instruction from COMSUBLANT for conducting overhauls and sea and dock trials. Could you turn back to the part pertaining to conducting a deep dive?

A. Yes, sir. (The witness examined Exhibit 203.)

Q. There is a paragraph there which refers to the Bureau of Ships Manual. Could you read that part?

A. "Conduct deep dive to test depth with all hands stationed throughout the ship to inspect for leaks and correct them. Perform tests specified by BUSHIPS Technical Manual, Article 11-124."

Q. Could you tell us briefly what that particular article requires? Does it go into detail on it?

A. I can't answer that, Admiral. I don't recall what the article says now. I don't have it here.

Q. Did I understand you to say that you all had been taking a look at this instruction and you thought it looked pretty good?

A. Yes, sir. It is under review now. We have not by any means completed that review. We are going through it with a fine tooth comb to see what changes we will make. This particular one is part of a package that is being looked at now.

Q. Referring to the trial procedure which the Commanding Officer of THRESHER promulgated for his last trials; he apparently intended to conduct his deep dive in two parts. The first was the initial dive in which he said he was going to station personnel in all compartments, man phones, check for leaks, and establish UQC communications with the escort. The next item is submerge to test depth; then return to periscope depth. Now, on the second dive, for which he allows six hours, he has such items as submerge to test depth; cycle main vents; operate garbage disposal unit; test torpedo tubes; operate all bulkhead flappers and water tight doors; operate main sea water and auxiliary sea water valves, which apparently he planned to test in two phases, operate all sea valves at half test depth and again at test depth. This would imply that on his first dive he was merely going down to test these things without checking the operability of any of his valves at all. Do you think this is a sound procedure?

A. No, sir. I don't know that this is what he did, but certainly would indicate that. Again, we did not review this prior to the test dive or prior to the sea trials at all.

Q. Perhaps the instructions that SUBLANT issues should cover in more detail what the ships are required to do in their deep dives.

A. (No reply.)

Unclassified

## Questions by the president, VADM Austin:

Q. Captain Zurcher, to continue with that line of questioning, you did not review his agenda for the test dives here at all. Do you think that with the complexity of SS(N)'s and SSB(N)'s and with the sophisticated and numerous systems involved in these ships, and in view of the fact that the Commanding Officer and Executive Officer of this particular ship had both been relieved just three months before the ship went out for its test; in view of all these things, do you not think it would have been appropriate for a review of the Commanding Officer's prospective agenda for these dives at a higher level than the Commanding Officer?

A. Yes, sir, Admiral. I can't say, after the fact in particular, that it should not have been done. After overhauls the Squadrons get into this, and anything which deviates from our recommended procedures, they have to approve it.

Q. But the Squadrons usually do what the Force Commander indicates he would like them to do; is that not correct?

A. Yes, sir.

Q. Now, keeping in mind the fact that the Commanding Officer and the Executive Officer had only been on board for three months and that the ship had had its time in the Yard extended roughly a month during those three months, do you think that something which had been as much of a controversial issue as the safety of sil-brazed joints should have been left entirely to the Commanding Officer to look into during this hectic period toward the end of his overhaul?

A. No, sir, Admiral. I don't think it was. I think that the technical bureau and Portsmouth and my Materiel people, in particular, were looking at this problem all the time.

PRESIDENT: Captain, I wish that had been true, but the facts do not bear out what you have just said. The Bureau of Ships issued a letter on 28 August 1962, in which it prescribed a minimum of effort in this direction to insure the integrity of the joints on THRESHER, but during the entire period, from the time the THRESHER entered the Yard in August of 1962, until she went out for her last dive in early April of 1963, the total number of joints ultrasonically tested on that ship was about 170, and of those 170, 14 per cent failed to pass the required test. Furthermore, the ship that had been in this Yard just before the THRESHER, the SKIPJACK, had had a number of joints tested, both visually and by ultrasonic means; 1120 joints were visually inspected on the SKIPJACK, and of those, 97 failed the visual test. Of those 97, 59 were ultrasonically tested, and 29 were found to have inadequate bond; and then between the hull and the back-up valves, 116 joints were ultrasonically tested, 24 of which failed. In other words, Captain, there was an over-all failure of joints on SKIPJACK by ultrasonic testing of 25.7 per cent. In view of what I have just said, I cannot agree with you that the Bureau of Ships, the Naval Shipyard, and the Force Commander were all giving their vigorous and full attention to this subject.

(b) (6) relieved (b) (6) as reporter at this point.

Q. Captain, you testified that in the case of a flooding casualty in one of the b(1) boats, you would be inclined to stop the flooding casualty as quickly as possible, even if it meant shutting down the power plant. I would agree with your analysis, but I wonder if that was the philosophy which obtained in the THRESHER and in the other b(1) boats prior to the THRESHER casualty. Would you give the court your view on that?

Unclassified

A. I cannot say whether that was the philosophy, Admiral. It depended, of course, on the severity of the flooding and whether or not they could trade off stopping this flooding for losing power. I don't believe that this is a philosophy of arbitrarily shutting down that is at all prevalent on the **b(1)** boats, regardless of the consequences. I am sure that all the skippers fully realize the importance of power on the screws and the need for it, and the lack of positive buoyancy to reserve ballast they have. And I'm absolutely sure that every one of those skippers understands the serious consequences of losing power. But if you have no other choice and you have a large hole that might be up to ten inches, you would be in serious trouble if you left it flood very long.

Q. Well even with a much smaller hole --

A. Yes, sir.

Q. -- you have not minutes, but seconds, in which to make up your mind. And you also have very vulnerable switchboards which can multiply your difficulties if they are allowed to be sprayed for any length of time. And so it would seem advisable in a normal flooding situation to shut the valves and stop the influx of the water even though so doing might cause you to lose power, because although your blowing capacity is smaller than you would wish it to be, you still do have blowing capacity. And without too much negative buoyancy, and with your EPM, and perhaps **b(3) 10 USC 130** on your main power plant, you might well pull yourself out of a normal flooding situation. Whereas, if you do not secure the source of flooding promptly, your chances are not too good. Would you agree with that?

A. Yes, sir, Admiral, I would.

Q. Now, Captain, in your testimony you said that close tabs were kept by the Force Commander and his staff on the overhaul of submarines at shipyards; and then you went on to say that you must rely, of course, on the Bureau and on the Shipyards for technical advice. Don't you have a Materiel Officer on your Staff who is as competent technically as anyone in the Bureau or Shipyards?

A. Yes, sir, we have four ED's on the staff who are so technically qualified, and, as you indicate, Admiral, as well as the people in the Bureau. However, the Bureau makes many decisions on many things, and they also do a lot of research into areas that cause changes to come about; and this is the area in which we rely heavily on them, on decisions, funding, SHIPALTS, readings for changes, and so on. And they have to keep thoroughly abreast of what's going on in the Bureau at all times. And the technical advice we get from them we do lean on heavily. And we refer many questions to the Bureau for decision before we take action on them ourselves.

Q. Well that is quite understandable, but I was afraid that the use of the phraseology that you "must rely on them for all technical advice," had been used in a way as to mean that you had to sit and wait for them to give you information, such as the information regarding the safety or unsafety of the hazardous piping system in THRESHER or SKIPJACK.

A. No, sir, we did not have to wait for them to give us advice in these matters. We monitor as best we can with the limited number of people we have with the vast number of submarines being built, overhauled, PSA, and so on, Admiral. It's impossible for us to get into the details of every submarine and every job that's being done.

PRESIDENT: This is appreciated; and I understand also, of course, that you had a very fine and a very able officer in Commander Krag who was up here looking into the THRESHER's overhaul from your Staff. Unfortunately he was lost with the

Unclassified

ship. But there seems to be a lack of flow of information regarding the safe material condition of submarines in overhaul from the overhauling point to COMSUBLANT and his Deputy. The reason I say this is because such things as the occurrence of the high rate of failures in SKIPJACK does not seem to have reached you or your Force Materiel Officer. Either the flow is inadequate or there's too much time lag involved in it. Because it is only at the Force level that policy decisions can be made which affect the over-all safety of all submarines in your Force. It is understood that you cannot get into the details of every overhaul, but the responsibility does rest with the Force Commander to insure that the over-all policies and instructions are such as to promote the safety of all the ships in his force.

Neither counsel for the court nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court recessed at 1310 hours, 14 May 1963.

The court opened at 1410 hours, 14 May 1963.

All persons connected with the inquiry who were present when the court recessed were again present in court:

No witnesses not otherwise connected with the inquiry were present.

Captain Harry A. Jackson, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry and advised of his rights under Article 31, Uniform Code of Military Justice, was duly sworn, and examined as follows:

COUNSEL FOR THE COURT: Captain Jackson, this is a closed session of the court and classified information may be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, grade, organization and present duty station.  
A. Captain Harry A. Jackson, Captain, U. S. Navy, Engineering Duty Officer, Qualified in Submarines. Present duty station is Fleet Ballistic Missile Project Officer at the Puget Sound Navy Shipyard.

Q. Could you very briefly describe your naval background and experience?  
A. You want the whole thing?



Unclassified

Q. In a nutshell, if you can.

A. Well I was an enlisted man in the Naval Reserve for five years, commissioned Ensign in 1941. I was the Docking Officer and Ship Superintendent, Naval Shipyard, Boston; Destroyer Type Desk at the Bureau of Ships; Docking and Repair Officer on a Floating Drydock in the Pacific during the war. In 1946 I reported to the Atomic Energy Commission at Schenectady, New York, in the development of nuclear power for naval vessels. In '51 I reported to Portsmouth Naval Shipyard as Assistant Design Sup. In '54 I went to OPNAV as Head of the Nuclear Power Division; '56 I reported to BUSHIPS, worked on the preliminary design of POLARIS submarines; '58 I reported to Portsmouth as Design Superintendent; '62 I reported to my present job at Puget Sound Naval Shipyard.

Q. You were the Design Superintendent at Portsmouth Naval Shipyard from what month in 1958 to what month in 1962?

A. June of '58 until May of '62, and from May until August I was the Acting Planning Officer.

Q. The Acting Planning Officer, is that right?

A. Yes.

Q. Turning then to your duties here at the Portsmouth Naval Shipyard, we would like you to discuss, first of all, certain of the design characteristics of THRESHER's high pressure air system. Were you aware of her limited de-ballast capability at the time of her construction?

A. Yes, sir.

Q. Was this a subject which caused you any concern?

A. Yes, sir, I have to agree.

Q. Was this a matter which you discussed with her Prospective Commanding Officer or other officers of THRESHER?

A. Well I can't remember the exact details of the discussions, or when they took place, or what words were said, but I do know that this was a subject of discussion. It was discussed whether or not we should attempt to blow the main ballast tanks at deep depths, and after some discussion it was decided that this would not be prudent.

Q. Could you tell us the reasoning behind the decision?

A. To the best of my memory, the reason they concluded not to try it was the fact that we might make an uncontrolled ascent and that there was the hazard that the ship would go out of control.

Q. How was that, Captain Jackson; how would one lose control of his ship by blowing the main ballast tanks?

A. Well if you started to blow the tanks and you got a positive buoyancy due to air, and the ship started to ascend, the air would expand, de-water the tanks more rapidly, and there was a large possibility that the air would expand faster than you could vent it out through the vents.

Q. With whom did you discuss that, whom of the ship's crew?

A. Well as far as I can remember, it was with Captain Axene, and I think the Executive Officer, Lieutenant Commander Wallington, was present, and possibly one or two of the other officers.

Unclassified

Q. I refer now to the decision to so construct the high pressure air system that it entailed the utilization of reducing valves reducing pressure b(1)

Was that feature of her design discussed by you with personnel of the Bureau of Ships?

A. Not to my knowledge; I can't remember whether it was or not.

Q. This was part of the plans which were laid on you to carry out?

A. I'd have to go back and check the contract plans, but I think this is correct, that they are shown that way in the contract plans.

Q. We have heard that it was a feature of the high pressure air system that main ballast tanks 2, 3 and 4 would fail shut, and the Captain's Bank, Bank No. 1, would fail open. Was that a feature peculiar to THRESHER's design and construction only?

A. No, sir, this is exactly the same as it is on the 616 Class, I know for sure. I think it's the same way on the 585 Class and the 598.

Q. I turn now to a consideration of the quality of workmanship associated with the construction of silver brazed joints in vital sea systems of submarines built a matter of several years ago, before the device of ultrasonic testing was available during a submarine's construction period. Were you knowledgeable of the BARBEL investigation into a casualty resulting from the use of improper materials and workmanship in her piping systems?

A. Yes, sir, I'm quite familiar with that.

Q. As a matter of fact, you were a witness in that Board of Investigation, were you not?

A. That is correct.

Q. Did you also, thereafter, visit Mare Island Shipyard to look into the matter of a failure of certain joints in SCULPIN?

A. Yes, sir, I made a trip out to Mare Island sometime, I think, in November of 1961, when they were having the investigation on the SCULPIN joint.

"Commander, Mare Island Naval Shipyard letter 9480/SS(216-7720) of 12 April 1962, to Chief, Bureau of Ships, Subject: Silver Brazed Sea Water Systems, procedures during overhauls on submarines; comments on," which document relates to the USS SCULPIN, was submitted to the court and was offered in evidence by counsel for the court.

There being no objection, it was received in evidence and marked Exhibit 205. The reading of Exhibit 205 at this time was waived by the court.

With reference to certain design characteristics of THRESHER concerning which the witness had already testified, 'OPNAV INSTRUCTION 09010.119A of 6 May 1958, Subject: Submarine Attack Type SS(N), SCB Project No. 188; approved characteristics for,' was submitted to the court and was offered in evidence by counsel for the court.

There being no objection, it was received in evidence and marked Exhibit 206. The reading of Exhibit 206 at this time was waived by the court.

Q. Captain Jackson, because of your position in the Shipyard, were you also aware of the results of certain ultrasonic testing performed on silver brazed joints in SKIPJACK during her recent overhaul which ended, I believe, in the summer of 1962?

Unclassified

A. Yes, sir. As a matter of fact, I was quite interested in this and pushed the examination of silver brazed joints by ultrasonic methods.

Q. Now, turning to THRESHER, at the commencement of her post shakedown availability period, were you present at the Arrival Conference held to consider the work to be accomplished in THRESHER during her post shakedown availability?

A. The Arrival Conference occurred during my last week of duty at the Shipyard, and I'm not sure whether I attended the conference or not.

Q. As Acting Planning Officer prior to that last week of your duty, did you engage in certain preparations for THRESHER's post shakedown availability?

A. Yes, sir, the Shipyard as a whole was very busily engaged in preparations.

Q. Bearing in mind the knowledge you had received as a result of your familiarity with the state of silver brazed joints in BARBEL, SKIPJACK and SCULPIN, can you state whether there were any discussions as to the extent of the ultrasonic surveillance to be conducted on THRESHER's old silver brazed joints during her post shakedown availability period?

A. There was a lot of discussion about this very thing; however, there were no decisions made to that effect before I left. This came under very exhaustive discussion.

Q. But no decisions were made. Was the issue of whether or not joints should be unlagged for the purpose of ultrasonically testing them a matter of discussion prior to THRESHER's arrival?

A. Yes, sir, this is all part of it. You can't inspect joints without getting to them.

Q. Did you make any recommendations in that regard?

A. I honestly don't recall whether I did or not. My general philosophy on silver brazed joints was that they were not as good as a welded joint, and I had long been an advocate of welded joints.

Q. Did you have any special qualms or fears for the safety of THRESHER's silver brazed joints in her vital systems because of the fact that she was built in a period when such joints were not subjected to ultrasonic inspections?

A. The only way I can honestly answer that is -- I never failed to go to sea on her when I had an opportunity.

Q. Since the loss of the THRESHER have you given considerable thought and review in your own mind to a possible answer for the causes of her loss?

A. I'm just like everybody else. I've spent many, many hours trying to find out what could have caused the accident.

Q. Do you have any hypothesis, based upon your peculiar familiarity with her design, which you think might be helpful to the court in its work?

A. I'm pretty sure that you all have thought about this and talked about the same thing because there are so many other knowledgeable people that have talked. There's no question that she became heavier than the buoyancy that she had to support her. This is obvious. Now there are several ways that this could happen. The most obvious one, of course, is flooding inside the ship. However, I can develop another hypothesis that would cause the loss of the ship without flooding. I consider this to be remote, but it's possible.

Unclassified

Q. What is that, Captain Jackson?

A. Well I have long had differences of opinion with what constitutes a good trim dive. These differences of opinion have occurred not only with submarine officers but with other submarine building officers, and I think it's possible to be considerably out of trim and really not know it. People report they have a good trim, but I think it's still quite possible that you could be considerably heavy; then, as a ship goes deeper, of course, you get hull compression, and you lose a little bit more buoyancy; and if you got in a thermal gradient, you could lose some more; and at deep depths you'd just be heavy. Then if something occurred so that you lost power, you all of a sudden found yourself with no way on the ship and you're heavy and it will just slip away from you.

Q. From your association with the ship's officers and crew during her period of construction, do you feel that they were fully apprised of these propensities of THRESHER in a new and unfriendly environment at deep depths?

A. Well, in my opinion, the officers and crew that first took the THRESHER to sea -- and those are the ones I know best -- were exceptionally fine officers and very well trained. I'm sure that they have the same fundamental knowledge of possibly being heavy and the loss of buoyancy as they go deep that I have. If you asked me did I take the trouble to specifically point out this possibility and so forth, I would have to answer, "No, I did not." But I assumed that they knew as much, or possibly even more than I did about the handling capabilities of submarines.

Q. Did you discuss any damage control philosophies with them, with particular reference to flooding?

A. Yes. There were numerous occasions when we discussed possible actions, what course of action to take, and related other situations to what could have happened to THRESHER.

Q. Do you recall any specific talk about how to handle flooding in the auxiliary sea water system?

A. Yes. I can't name the specific time or date, but we talked about it, and the necessity for putting hydraulic operators on the hull valves and on the back-up valves, and the philosophy of if you have flooding that the first thing to do is bottom up the ship, close it up. This was proven on occasion when we had leaks in the salt water system on some of the early dives; they actually had to close up the ship.

Q. And then later find and isolate the leakage?

A. Yes.

#### EXAMINATION BY THE COURT

Questions by a member, CAPT Nash:

Q. Captain Jackson, in the event of blowing main ballast at deep depths, was there a fear of rupture of the tanks?

A. Well this was discussed as a possibility, and it was discussed -- when you use the word "fear", I don't know how to really interpret it. It was acknowledged that there was a possibility that this could happen.

Unclassified

Q. Were any studies conducted to determine the likelihood of such a casualty?

A. Yes, we ran some quick calculations. I'd hesitate to call them studies; but at least the question was asked, what would happen if they blew the tanks, and there was the acknowledged possibility that you could get a differential across the tanks higher than the pressure for which the tanks were designed.

Q. In order that such a thing happened, however, was it necessary that the submarine attain positive buoyancy and upward momentum?

A. Yes, it would have to have. As I remember the calculations, you'd have to get a very high vertical velocity and be going up pretty fast for this to occur. The limitation is either how fast you can vent off the air or de-water the tank. But in this regard, the experience that we've had in tanks that had been overpressurized -- in two instances I know where this happened; one was the TANG and the other the BARBEL -- it was always the bottom part of the tank that failed. So if it did fail and rupture it would probably be on the bottom side of the tank.

Questions by a member, CAPT Hushing:

Q. Did you ever consider running a complete blow of the air banks into the tanks?

A. By complete, you mean emptying the entire air banks?

Q. Yes.

A. No, not to my knowledge. I never did consider this.

Questions by a member, CAPT Osborn:

Q. How did you instruct the crew to line up the ASW system?

A. Well if you're talking about me personally, I really didn't. We had a training program in which the representatives of the Design Division who designed the systems talked to the crew, outlined the characteristics of it, and the instructions are exactly the same as those that are written in the General Information Booklet.

Q. I have a question with respect to two important points: one, when the ship was built the constant vent system **b(3) 10 USC 130** with check valves in it --

A. Yes, sir.

Unclassified

Q. --and, secondly, the normal valve line-ups involving **b(3) 10 USC 130** the ASW print prior to the installation of check valves were normally open?

A. I think this is correct.

Q. So, I would ordinarily assume under those conditions that although **b(3) 10 USC 1** had a possibility, that the normal line-up of the system was still **b(3) 10 USC 130**

A. I think this is right; and if it's shown that way on the diagram, this is correct.

Q. Well, the diagrams haven't been revised since the check valves in the constant vent system have been installed, other than the supplementary prints. Now, I want to ask you one other thing in terms of the design. Under what conditions did you run into putting in your design, or what led you to the reason for having isolation valves in the engine room and isolation valves in the AMS that both had to be shut to completely isolate the system?

A. I don't think I can answer that question without reviewing, and I'm not sure that I would have made that decision.

Q. I will review the question. One, why, or do you remember the multiple isolation system, one in the AMS, one in the engine room, why they were incorporated into the design; and were special studies initiated or procedures initiated to use this system any way to ultimize flooding control?

A. The answer to the first question is that this was in the process of development. As you know, we were making new developments, new designs, at a very rapid pace. In the last twelve years, you know that every ship is different. And this is a stage along in development. On the 605 Class, which was a later design, we had recognized some of these deficiencies of having multiple stations and we had incorporated what is, in effect, a damage control station in the engine room where you could close it all up from one place. This is a process that developed.

In the second part of the question, did we fully acquaint the ship force with all the control features and completely indoctrinate them in the methods of using them, I really can't honestly answer that; although we attempted to, by having a training program in which the ASW system was discussed with the ship's force. We had instructions by the people who designed it, met with the ship's force, told them the theory behind the design, the philosophy, and how it should work. How well they did this job is subject to interpretation.

Q. I did not mean to imply that this was primarily your job. All I'm asking was, did the ship's force ever bring up an idea of operating the ASW system from single station control, say, in the maneuvering room?

A. I'm not sure where the concept of damage control operating from one station originated, but as a result of thinking, discussing, and so forth, this concept, we did end up with that concept on 605. THRESHER crew may, and probably did contribute to this philosophy.

Q. Had the THRESHER crew, itself, realized the limitations imposed by operating the system, or ever discuss that they were going to operate their system this way?

A. Not with me; they may have with other builders, but they never discussed this with me.

Unclassified

Q. I understand you had a constant vent leak in the ASW system once when you were at sea in THRESHER. How was that isolated?

A. It was eventually isolated by shutting down the entire constant vent system and ASW system, and once it was isolated, of course, it was plugged.

Q. "It was eventually--"--how long did this take?

A. Since I wasn't directly on the scene all the time, I can't say for sure; but it was in the order of four or five minutes.

Q. But you know since we had eighty per cent of her crew who were on the ship when the ship was lost, most of the people were very familiar with the fact that it was very difficult to find the leak; is this correct?

A. I would assume so, yes, sir.

Q. You would assume so? The word got around to you, didn't it?

A. I knew it was difficult, yes, sir. No question about that.

Questions by a member, RADM DASPIT:

Q. Captain Jackson, in developing the detail plans for a new class, do you ever find yourself handicapped by the contract plans; that is, you would find something you didn't think was sound and wanted to change it and you could not get it changed?

A. Yes, sir, this has happened many times.

Q. Could you give us one or two examples?

A. A more recent example I can give you on the 555, which I remember.

Q. That's all right, any example.

A. It had a square flat surface trim tank which we at Portsmouth thought would cause stress concentrations in the elliptical head and would not produce an entirely satisfactory submarine. So we designed a new type of trim tank and proposed it to the Bureau of Ships. There was considerable reluctance on the part of the Bureau of Ships to accept this, and it was only after some rather exhaustive tests that it was accepted.

Q. Would it have involved an increased cost to the ship?

A. In my opinion, it would have made a cheaper job, but far more satisfactory.

Questions by a member, CAPT OSBORN:

Q. The trim line shock condition put some very high pressures in the trim line in the initial sea trials of THRESHER--

A. Yes, sir.

Q. --and led to the so-called impulse method of testing the system with respect to leaks. I would like for you to discuss this system and say whether it was applied to any other system other than the trim system; and, secondly, why was the system later discarded?

A. Well, I was a party to what is called the impulse test, but it was never designed to be an impulse test as such. On the initial sea trials of THRESHER when they admitted water to the trim line, we got what appeared to be high pressures to the hydraulic hammer; and, as you know, it actually caused part of the pipe to fail. In trying to rationalize what happened, I said, "Gee, this is something we don't know enough about and apparently can only find out what happened at deep depths." And the philosophy--I said to myself,

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"I've got to bring the ocean alongside the ship so I can test it this way." And the only way that I could do this was to put a tank of water with a large head of air on it alongside the ship and pipe it up to the trim line. And this test, as far as I was concerned, was put into effect primarily to find out what was happening so we could put some hydraulic tests on it and measure the hydraulic impact we were getting in the line due to the quick operation of the valves. When we did this, obviously, we were getting sufficient pressures and forces in the pipe lines that it would make them vibrate and jump around; and when people saw this, they said, "Gee, this is a good test. If a piping system will stand up under this kind of treatment, it proves that the line is satisfactory." And this is why it became called the impulse test. We actually shifted our tank over to the drain line and ran the same test on the drain system and impulsed it a hundred times to peak pressure which we're limited to--I think the top pressure we got was 1100 psi--and after this occurred and people watched the pipe jump around, they all said, "Gee, this is a satisfactory joint," or, "The joints in the drain line are satisfactory because it withstood this rather tortuous test."

Q. Did you ever put this on the ASW system?

A. No, we did not get it on this. Although there are rather complete records of what we did do, and I would suggest if you want to know for sure what happened, you refer to the records.

Q. Why was this system discontinued?

A. To the best of my knowledge, it was discontinued due to the cost, the high cost of setting it up and running it.

Q. High cost of initial equipment?

A. No, just the manpower to rig it up and run it. As you know, it's a rather hazardous thing. You get this big tank of compressed air up to four or five hundred pounds and you have to take elaborate safety precautions.

Q. I note, in the records of meetings, that you proposed in Mare Island in November, 1961, that they use this on SCULPIN's joints; yet, the test was discarded by January; and I wondered if you knew anything of the reasons why it was. Was it the initial cost of the installation out there or what?

A. At that time, Mare Island was in the process of developing their ultrasonic test, and they honestly believed, and I do now, that the ultrasonic test is a better way of telling whether the joint is satisfactory or not. Mare Island attempted to make an impulse test using smaller equipment, smaller tank, smaller head of air, lower pressures, and they never did develop any really high hydraulic hammerage in the pipe.

Q. Now, do you remember after the BARBEL casualty, which occurred on 30 November, and the salt water systems on THRESHER were completed in February of '61, roughly two months, or two and a half months later, do you remember whether any of the lagging was stripped off of the pipes to inspect the joints visually?

A. There was a very extensive program to get in and inspect the joints and we developed a set of criteria which would guide the people who were inspecting it to determine whether or not the joints were satisfactory. There was a program installed on THRESHER and the Pipe Shop went through and inspected many of the joints. Some of the lagging was removed. I would hesitate to make an estimate of how much. I am sure all of it was not, but I am sure some was.



Unclassified

Q. You know that sufficient lagging was removed to determine material identification?

A. I do not know for sure that we removed enough lagging so that we would know one hundred per cent pipe identification.

Q. Some effort was made in this area?

A. Some effort is correct.

Questions by a member, CAPT NASH:

Q. I believe you testified that on the occasion of the leak in the constant vent line during the sea trials, the leak was stopped by isolating the entire ASW system; is that correct?

A. I think this is correct.

Q. Was main propulsion maintained during the time that the ASW system was secured?

A. By the time I got back to where the leak was, the shaft was still turning, and it kept on turning until we had completely fixed the leak on a temporary basis. I do not think that we ever shut down the shaft.

Q. Was the main plant ever shut down?

A. Not to my knowledge. By "main plant," you mean the main turbine and reduction?

Q. The reactor?

A. To my knowledge, it was not secured.

Q. Following this occasion, was there any discussion on board the ship as to the requirement to shut down when you secured the ASW system?

A. Yes, there was some discussion but I don't remember the details.

Q. Could you say, however, that the THRESHER realized that it was feasible to continue field operation of the plant for some period with the ASW system secured?

A. I think so, yes.

Q. Do you remember the size and location of the leak in the constant vent system?

A. The location was on one of the Lube Oil coolers, and it was on the forward one, and the location of the leak was on the starboard side of the ship just underneath the propeller shaft about fifteen feet forward of the after bulkhead. The size of it was, I think it was a three-quarter inch line, three-quarter inch tube size.

Questions by the president, VADM AUSTIN:

Q. Captain Jackson, you said, I believe, regarding ultrasonic testing, that at Mare Island they had great confidence in this and that you do "now" have confidence in it?

A. Yes, sir.

Q. Does that mean that you did not have confidence in it while you were here at Portsmouth?

A. I have to go back to the situation in November when we went out there. This is the first time that I had seen ultrasonic testing applied to pipe

Unclassified

joints. The ability to get good readings depends on the size of the ultrasonic head. This was the first time I'd seen one that small. I had no feelings about it one way or the other at the time; it was the first time I'd seen it. I acknowledged that this was a potential development, but I wanted to see it in operation more before I reached any firm convictions.

Q. Now, this was when, again, the time of your trip out there?

A. I think it was in November of 1961.

Q. Can you recall whether or not your confidence in ultrasonic testing developed before you left your job here at Portsmouth Naval Shipyard?

A. Oh, yes, sir. It developed as a result of our experience on the SKIPJACK.

Q. But the SKIPJACK results, while conducting towards confidence in the ultrasonic testing technique, did disclose roughly 25.7% failures by the established standards at that time in the joints tested. Did this shake your faith in the joints that had been made prior to the time when ultrasonic testing became available?

A. Well, like everyone else experienced in the sea water systems of submarines, I have a great deal of concern about all joints. But I must reiterate that I've never failed to go to sea on a submarine when I've had an opportunity.

Q. Neither have I, Captain--

A. I'm sure of that, sir.

Q. --but I must say that, as of now, I might hesitate to go **b(1)** in a ship that had been built before 1960 and one on which there had been no tests other than by impulse or hydrostatic means. And would you not share my concern?

A. Yes, sir, I share your concern; but I'll still ride the <sup>Plunger or</sup>~~plunge~~ on any of the **b(1)** boats **b(1)**

Q. Well, I must say I would be willing to ride them, too, but I would want to say how they were operated.

A. Yes, sir, I would agree with you on that.

Q. I would want to be sure the people who were going to be running them believed with me that if we got a joint that failed, we would--

A. Know what the proper action--

Q. --know what to do immediately and not determine after the event what to do.

A. This I would agree with you a hundred per cent. As a matter of fact, after the BARBEL casualty, I had many, many discussions with Captain Meyer, who was the Captain of that ship at that time, about the action he took and whether or not it was the proper action.

Q. Have you, since the THRESHER casualty, thought much about electrical switchboards?

A. Yes, sir, I've thought a great deal about electric switchboards.

Unclassified

Q. Is it your feeling, as a result of this thinking, that electrical switchboards leave a good bit to be desired in the way of resistance to salt water spray?

A. Yes, sir, no question about it. Can I qualify that a little bit?

Q. Yes.

A. Perhaps not salt spray in the normal sense of just dripping down, but squirting under high pressure.

PRESIDENT: Yes, that's what I mean.

Neither counsel for the court nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

(b) (6) relieved (b) (6) as reporter at this point.

The witness made the following statement:

WITNESS: Since I'm not sure of what you've already listened to, I may just plow over old ground and probably will.

One of the things that I thought about immediately is, if you had a leak in a salt water line, that the first corrective action would be taken to close up the ship as rapidly as possible, even if it meant closing up all the hull valves. When I think about this, I say, "All right, suppose they did just exactly this and they could not close off the leak." Then there's a possibility of a hull connection outboard of the hull valve leaking, and we have a number of elbows coming up off the hull up to the valve. There is a possibility that one of those leaked and, if so, the ship's force couldn't do a thing about it.

Another thing I've thought about is the amount of ~~sheeting~~<sup>sheathing</sup> and so forth that we put up, really for the sake of habitability, to make it look nice; but when we do this, there are certain vital pieces of equipment that are put in awkward positions and that makes them difficult to get to. As an example, the priming line failure on THRESHER was behind much sheet metal, and it took them the better part of an hour to get to the joint, to find it. They had to cut through this. I was concerned about this after the BARBEL incident because they experienced the same sort of difficulty.

I think in the future it would be well not to be so habitable and leave things more accessible.

I have discussed this with a number of other qualified submarine people and there seems to be a tendency to say that they had a silver-brazed pipe joint failure leakage; and, while I may even acknowledge this as the most probable cause, I cannot accept it as the cause because there are so many other things that could happen that it ought to be very thoroughly explored. I tried to describe one in which there was no flooding whatsoever that could cause it. And I do this because many times in my past I failed to hit on the solution of

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a thing because I grabbed at the obvious solution which later turned out to be not so, and I just hope--because it looks so obvious that it could happen--that people don't stop looking for something else.

PRESIDENT: Captain, this court has not stayed in session this long because of the lack of things to "grab at." Nor has it been entirely because of the beautiful scenery around Portsmouth, New Hampshire.

WITNESS: I am sure of that, Admiral.

PRESIDENT: It has been for the very purpose that you have pointed up, of avoiding undue highlighting of one possible cause and perhaps, by so doing, causing the sinking of another ship.

WITNESS: This is my concern.

PRESIDENT: And we fully realize that in the THRESHER we had a ship, a fine ship, that had had more concentration on that part of the ship which was best designed and best operated, which is the nuclear branch part, and some of the rest of it might have suffered by the concentration of the effort on the nuclear plant and keeping it from stopping.

WITNESS: This is a possibility.

PRESIDENT: Avoiding hazards to it. We are fully aware of the need to keep things in balance in this respect, so we are happy to hear you are concerned about the same thing.

WITNESS: I didn't mean to imply that I didn't think you were doing this, but I just wanted to add another voice to it.

PRESIDENT: Do you have anything further, Captain, you want to tell us?

WITNESS: The only thing I can say is probably I was as close to the THRESHER as any other person in the Navy, and I can look at myself and say there are many deficiencies that might have caused it.

PRESIDENT: But you still have faith in the basic design of the THRESHER, do you?

WITNESS: Yes, sir, and if the Chief of Personnel would only assign me to one of those ships, I would go now, not tomorrow, but right now. I have great confidence in them.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court then recessed at 1513 hours, Tuesday, 14 May 1963.

The court opened at 1530 hours, Tuesday, 14 May 1963.

Unclassified

Frank Dunham, civilian, a former witness for the court, was recalled as a witness for the court, reminded that his previous oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: Mr. Dunham, this is a closed session of the court and classified information can be divulged here.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. For the convenience of reference in the record, would you please state your name and your duties here at the Shipyard?

A. My name is Frank Dunham. I am the Assistant Chief Design Engineer for naval architecture in the Design Division.

Q. During your previous testimony you undertook to perform a calculation based upon the actual thickness of the plate used in THRESHER's hull in order to give us your conclusions as to the likely order of implosion of the pressure hull.

A. That is correct, yes, sir.

Q. Have you made those calculations?

A. Yes, sir, I have.

Q. Would you please give us the facts that you have been able to develop?

A. In my testimony, I submitted an exhibit of the structural profile of the THRESHER, and above that profile I had plotted the factors of safety of the pressure hull, using our design equation and using nominal thicknesses of shell plating and minimum yield point. We have obtained the actual thickness of shell plating obtained in THRESHER and also the actual yield strength of the shell plating; and I have used those numbers in those same design equations and have come up with new factors of safety. I have plotted these on the same diagram, using red in lieu of the blue so they'll come out. And I believe from these new plots, that there's very little difference between the collapse pressure of the three principal compartments in the ship, which would be the engine room, the AMS, and the control space. If you'd like, I will give you the minimum factors of safety I have arrived at though on those compartments. In the engine room, (b) (1) factor of safety. This is a factor of safety based on operating (b) (1). In the AMS, (b) (1). In the control space, (b) (1). I would like to present this as an exhibit.

The cited document was then offered in evidence by counsel for the court. There being no objection by the court, it was so received and marked as Exhibit 207.

Q. Would you define and explain your use of the term, "factor of safety," please?

A. For the purpose of this investigation, the factor of safety can be defined as the ratio of the design calculated collapse pressure to the operating depth (b) (1)

Q. Would that be a ratio of pressure to pressure or depth to depth, or pressure to depth?

A. It would be a ratio of depth to depth or pressure to pressure.

Unclassified

Q. And the ratio of the pressure at test depth to the pressure at collapse depth, is that correct?

A. No, the other way around, the pressure to collapse depth.

#### EXAMINATION BY THE COURT

Questions by court president:

Q. Mr. Dunham, what would you say is the accuracy of these figures? Are they accurate to one hundredth, or one-tenth, or what would be your best guess as to the accuracy of them?

A. May I ask a definition of this -- you mean --

Q. How reliable?

A. How reliable are these for predicting the actual collapse pressure?

Q. Yes.

A. I would say that these calculations would be slightly on the conservative side, not much. I would say that certainly the actual collapse pressure would be not more than five percent beyond this and in my experience with this type of structure, I would say that the collapse pressure would be two to three per cent about what our design equation has indicated.

Neither the counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated as follows:

WITNESS: I would like to take this opportunity to apologize for the delay. We experienced difficulty in finding the values of the yield strength. We had to search the steel mill archives and we had difficulty in digging them out.

PRESIDENT: We hope it wasn't too much trouble. I assure you we had plenty to do in the meantime.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court then recessed at 1534 hours, Monday, 14 May 1963.

The court opened at 1625 hours, Monday, 14 May 1963.

All persons connected with the inquiry who were present when the court recessed were again present, the court sitting with closed doors.

Lawson P. Ramage, RADM, U. S. Navy, a former witness for the court, was recalled as a witness for the court, was reminded that his previous oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: Admiral, this is a closed session of the court. Classified information can be divulged here.

Unclassified

DIRECT EXAMINATION

Questions counsel for the court:

Q. Admiral, this court has heard testimony which could fairly be described as the "silver-braze problem" which has developed in recent years and the extent of which has finally been revealed by means of ultrasonic testing of silver-brazed joints of two inches and larger size. Can you trace for us the flow of information to your headquarters on this subject from the Shipyards and the Bureau of Ships and from your own ship commanders, and the action taken by your headquarters to cope with the problem and to solve it?

A. Well, as I understand, this silver-braze situation certainly came to a head in the case of the BARBEL casualty, and that it precipitated many changes in instructions by the Bureau of Ships to the various yards and, certainly, our headquarters was well aware of it. However, prior to February 1962, there were no non-destructive tests, such as ultrasonic or radiographic, for silver-brazed joints for any submarine piping system. However, since that time the Bureau has put out several revised brazing procedures and Bureau of Ships instructions concerning the procedures for non-destructive tests and I think that since February '62, at least I am under the impression that this situation was being well taken care of, both under our instructions and by testing and by inspection.

Q. Not only was there the BARBEL casualty, there were certain lessons learned as the result of a failure of a joint in SCULPIN. Was this also well known to you and the members of your staff who were cognizant of such information?

A. I was only aware of the incident. I was not aware of the extent of the action that was taken as a result of it, other than that I know that my staff was well aware of it, and I presumed, of course, that this was all ground into the procedures and inspection, and other requirements required by the shipyards.

Q. Just prior to the overhaul, the post shakedown availability of the THRESHER, SKIPJACK was at the Portsmouth Naval Shipyard and I believe, at the request of COMSUBLANT or Deputy COMSUBLANT, an inspection of silver-brazed joints in SKIPJACK was conducted. I believe the inspection was conducted not only at the request of COMSUBLANT but was paid for by COMSUBLANT. Do you know the extent of that inspection and the results which were found out by it?

A. Not specifically, no.

Q. The information we have is that upwards of 1100 joints were visually inspected. Somewhere in the nature of 70 odd joints were ultrasonically inspected and that the rejection rate found in those joints was something over 25 percent. Can you state whether the results of that inspection were known to the cognizant members of your staff?

A. I'm sure the staff was well aware of the general results of this inspection, but at that time, no precise methods were available for silver brazing. To my knowledge, they're still actually subject to quite a lot of variation. In other words, many joints which are tested now ultrasonically, which would indicate an unsatisfactory joint -- that is if we call a 25 per cent bonding minimum, an unsatisfactory joint -- which still in effect would be a good joint. I saw several samples down at Electric Boat Company that were checked out at 25 percent minimum. that were tested before peeling, that stood four or five times maximum test pressure. So that I'm not convinced in my own mind that five per cent, ten per cent, 25 per cent, by our present testing methods, indicates a good joint or a bad joint. I do not think that our present standards for testing are that good yet. They still have to be improved.

Unclassified

Q. Nonetheless, would you agree that in order to have confidence in even a 25 per cent minimum bond there would have to be available the information that the rejected joints in SKIPJACK did have a 25 percent bond?

A. Well, I would like to ask the question were those joints that were rejected bad joints? That would have to be proved to me. I can only go out myself and test a joint, as I did, and get about five or ten per cent bonding according to my standards, my ability, but the joint actually was about a hundred percent joint. Now there is a great deal in this testing and you have to be an expert and the fact that you only get five or ten per cent, doesn't mean that you've got a bad joint unless you strip it and peel it and prove that it was a bad joint. Now, were those joints you are speaking of stripped and proved to be bad joints?

Q. That is exactly the sort of question, sir, that I am endeavoring to find out --

A. Without that information I can't say; I couldn't say unless somebody reported to me that these joints were bad. I would have no way of knowing.

Q. May I reiterate. That is exactly the sort of question that I am endeavoring to find out -- was it asked by any of your staff? Did they ask for information about SKIPJACK, about the results of the tests, so that they could assess the results in an effort to determine whether the integrity of the submarine was affected thereby?

A. To my knowledge, they -- I can't say that they specifically asked that particular question. I am sure the point was raised and investigated, and as I say, there is nowhere any record that I know of that indicates where a joint is bad or good, or the test procedures, results of the test or anything else, which you can say with any confidence that "this joint is no good; it's going to fail."

Q. Well, if that question was raised, it was not brought to your attention?

A. No.

Q. Is that a fair statement?

A. That is a fair statement, yes.

Q. Now, against the backdrop of facts springing from the casualty to BARBEL, the failures in SCULPIN, and the results of the inspection of SKIPJACK, THRESHER went into her period of post shakedown availability here at Portsmouth. At that time or shortly thereafter, there was a letter from the Chief of the Bureau of Ships dated 28 August 1962, Exhibit 115 before this court which I show to you now, sir. (Hands document to witness) The subject is "USS THRESHER silver brazed Piping," and I read to you: "The importance of this matter to the Submarine forces as such however is such that we must commence as early as possible to attack the problem"; and this is the silver brazed joint problem. "To this end Portsmouth Naval Shipyard is directed to initiate the following actions during THRESHER's PSA: Employ a minimum of at least one ultrasonic test team throughout the entire assigned PSA to examine, insofar as possible, the maximum number of sil-braze joints." That letter is dated 28 August.

A letter from Commander Submarine Force, U.S. Atlantic Fleet addressed to Commander, Portsmouth Naval Shipyard was introduced in evidence before this court, signed C. J. Zurcher by direction. This is Exhibit 182. In it, is the following statement: "It is requested that paragraph 2. a. of Reference (a)" -- and reference (a) is a Portsmouth letter of 9 August '62 -- "be modified to read as follows:



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"Visual inspection of all sil-brazed joints two inches and above which are unlagged and readily accessible, including all joints between hull and back up valves. Ultrasonic test all sil-braze joints between and including hull valve and back up valve which can be done without major removals of machinery, piping, foundations or hull structure."

Admiral, did that letter come to your attention either at the time it was mailed out or thereafter?

A. This letter was not in our headquarters when this letter was signed out.

Q. It was received later?

A. It was after, so it would not bear any connection.

Q. Except to this extent --

A. To the extent when we saw that, we realized it superseded or went beyond our letter.

Unclassified

Q. Was any letter sent to Portsmouth Naval Shipyard thereafter from your headquarters to ascertain the extent of the ultrasonic testing being conducted on the old silver brazed joints in THRESHER and the results of that testing?

A. Not to my knowledge. I know that Lieutenant Commander Krag was in touch with the work that was going on and the progress thereof, personally, but as far as any correspondence is concerned, I have no knowledge.

Q. How would you characterize, then, the adequacy of the flow of information between the Shipyards which repair your ships and overhaul them, and your headquarters, and from the Bureau of Ships and your headquarters, with respect to the information gleaned during inspections of the vital systems of your ships, sir? Do you get enough information?

A. I would say that we're in constant communication. I don't think there's a day that goes by that people on my staff don't call the individual skippers or vice versa, the planning-production in the yard, and the cognizant officers in the bureau. The telephone bill is terrific. On each and every point, as soon as it is raised, we follow up on it, not necessarily by a whole raft of correspondence, but certainly we do follow up, individually, with the people that are concerned by telephone, daily.

Q. How does your headquarters pass the worthwhile lessons learned from BARBEL, from SCULPIN, and even from SKIPJACK, to its commanding officers of submarines and their immediate commanders?

A. Well, there are in some cases, Force letters, information bulletins, and certainly specific dispatches when the urgency of the situation demands.

Q. Do you know of any specific means by which the lessons to be derived from the BARBEL investigation, and lessons to be derived from what was found out on board SCULPIN, were passed throughout the Submarine Force Atlantic Fleet?

A. Those were before my time. I can't specifically state.

Q. If the results of the SKIPJACK inspection were brought to your attention as involving almost a 25 per cent rejection rate in silver brazed joints, what would you have done with that information?

A. Well I would have been concerned, naturally, until--as I have been since I have found this out-- I have looked into exactly what that means, and I can't say that it means enough now to me to insure that this was in fact a serious situation. All the joints I've seen, that have presumably failed ultrasonic tests, that have been stripped--or first tested and then stripped--have been still good joints.

Q. Would you agree, sir, that the implications as to deep-diving submarine are greater than they would be with a submarine that operated at lesser depths?

A. I think that there are just as many other areas that could be suspect as the silver brazing, such as the casting on the headers of your heat exchangers, your rubber hoses, even your hydraulic piping. If you go to this extent, everything is suspect and not just the silver brazed joints.

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Q. Admiral, I would like now to take an overview of the status of THRESHER personnel and material at the time she got underway for her sea trials following her post shakedown availability. First, could you comment on the officer situation with emphasis on the fact that both her commanding officer and executive officer had been relieved within several months of the end of her post shakedown availability period?

A. I think I can simply say that, regarding the officer personnel on the THRESHER, she was as well off or better manned than any other SSN at the time. On 10 April she had three officers attached that were in the commissioning detail; three other officers that had been attached for at least one year or more. And as you pointed out, the commanding officer and executive officer had been relieved while THRESHER was in PSA, and neither had been to sea in THRESHER previously. It also should be remembered that THRESHER was operational for a period of only about nine months and that while an officer may have been attached for a considerable period of time, he may only have had very limited time on board in an operational status. The high turnover rate of officers, I want to emphasize, in SSN's is the result of the shortage of our nuclear-powered trained submarine officers. This is a worsening situation and it is of grave concern to COMSUBLANT and myself, and has been the subject of considerable correspondence.

Q. Did the overall situation which caused you grave concern also include grave concern because you had to replace the captain and executive officer so shortly before her sea trials?

A. No.

Q. Did you know the commanding officer and executive officer of THRESHER at the time she left on her sea trials?

A. I knew them, but not intimately.

Q. How much guidance and supervision was provided to them from your staff in formulating and reviewing the agenda for the sea trials?

A. Lieutenant Commander Krag was up here almost constantly in the last two or three weeks as I remember, going over all the trials, test procedures and drawing up the routine for the sea trials.

Q. Do you know of any requirements which would have made it mandatory for the commanding officer of THRESHER to consult with anyone in higher authority over the actual agenda of the sea trials?

A. Well, all the required tests agenda and so forth for the various sea trials are laid out in existing instructions, clearly laid out for his benefit, available for his use and if at any time he feels the need for further guidance, he has not only his squadron commander--in this case Commander, Submarine Development Group II--but the various people on my staff, to consult, readily available at the end of a telephone.

Q. Did you think that a relatively new commanding officer in a really new type of submarine, leaving for deep dives, should have been given any more than routine guidance as to the agenda for his sea trials and the means for carrying them out?

A. Let me point out this was not the first sea trials of the THRESHER by any means. She had been through her builder's trials, all her original sea trials. Her deep dives--she had been to test depth many times, at least 40 times. This was just a trial after PSA or what we would consider a normal shipyard overhaul. This was not an extreme case

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nor initial case and she had been through this. I'm sure the agenda of the original trials were available and certainly nothing more exacting than that was expected in this case.

Q. Was it the initial deep dive for her commanding officer, sir?

A. I believe it was the initial deep dive for him, not only on THRESHER but any deep submarine. But in this business we have many firsts these days. It's not unusual. Everybody is getting a "first" at something or other around here.

Q. Turning from the officer situation, the personnel situation in THRESHER, to her material status, at the time she got under way following her post shakedown availability, what was the source of your accurate information as to her material status and readiness for sea?--What was the source of it and what was the content of it?

A. Well the source would have been certainly from Commander Krag and Captain Zurcher and Captain Hamby, all three of whom discussed with me several aspects of the repairs that were going on, particularly the installation of the new **b(3) 10 USC 13** pumps and the associated piping which was a critical item as we were coming down the final stretch. As for the last intimate report I had with any of these officers, it was around the 29th, I believe, or 30th of March, just prior to the time that various members of the staff and myself took off for an inspection trip which included Norfolk, Charleston, Key West. I had no other specifics reported to me during that period of time.

Q. Did your inspection trips ever bring you to THRESHER during her PSA?

A. No, not specifically on the THRESHER in the yard.

Q. Turning from the personnel situation as it existed in THRESHER, to the situation as it exists in your staff, and as it existed on your staff during the post shakedown availability period of THRESHER, how many personnel, how many officers on your staff have had operating experience in nuclear-powered submarines?

A. We have never had more than just the one, at a time.

Q. Are you referring, sir, to an officer who had operating experience, or engineering experience?

A. Nuclear trained experience. We have at the present time six officers attached to the staff who have had nuclear submarine operating experience.

Q. Would you comment on the adequacy of that staffing to help you fulfill your responsibilities?

A. We have never been satisfied that we have adequate numbers of nuclear trained officers for staff billets, not only in my staff--the deputy staff--but also in the squadron staffs and various other areas in the Bureaus and in the office of the Chief of Naval Operations; we have a serious lag of nuclear-trained officers for all these very important billets.

Q. The years have gone by since the commissioning of NAUTILUS. Are you satisfied that the steps we are taking today to train officers in nuclear power will result in an easing of the burden which is placed on your staff by this shortage?

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A. In time, yes. We have adequate input of junior officers into the program. Number-wise we are in pretty good shape or will be, I should say, by the end of this year; I think fairly well off as far as numbers are concerned. But these youngsters have never been to sea; they have no operational experience. They lack maturity, judgment, and everything else that is required to make a suitable executive officer and commanding officer. We have situations now, of course, where the engineer officers on these ships show no interest whatsoever in the front end of the boat. They know nothing about the weapons, for example, and show no interest in acquiring such knowledge. Yet they are the only ones who are qualified under present standards to be executive officers and commanding officers.

Just as of about a week ago, one of the commanding officers of a nuclear submarine told me that he would not accept an executive officer--an officer as an executive officer--who had not at least five years' experience on an SSN or an SSBN. In other words he would have to know something more about the ship than just engineering; he could not serve properly as an executive officer without knowledge of some of the other officers' duties in his ship. This is the situation, gentlemen, we are getting into. We do not have any breadth or depth in our executive officers or commanding officers, and this limited experience that we have is going downhill fast where we lack the input of suitable lieutenants and lieutenant commanders into the program. This is the greatest thing that is bothering us. It is that, that has caused us this great concern that I mention.

(b) (6) was relieved by (b) (6) as reporter at this point.

Q. Have any steps been taken to establish a school to provide the trained officers?

A. We have schools, plenty of schools; it's not a question of schools.

Q. What is it a question of?

A. A question of input of these officers.

Q. Recognizing the advantages of mature and reflective hindsight, has your reappraisal of the tragic end of THRESHER led you to discover any additional steps which could have been taken during her post shakedown availability which would have contributed to a safer condition for her when she put to sea?

A. Now that's a very broad question, an all encompassing question, but I must say that as far as the personnel situation is concerned, as I mentioned before, the THRESHER was better off than any other ship in the Force, material-wise. I know she got more attention than we normally give a ship in overhaul, because of her special problems, her special equipment, her special installations. She was being readied for evaluation of much new gear; she got all kinds of attention. No ship have we given that much time to in the past. Maybe we didn't give enough time in certain areas. I would not say that we would have done it had we--I don't know if we could have done any more than we did. Certainly no corners were turned, no time was spared, nor any expense spared to get her in shape. Certainly, she had at least three or four extensions over her original completion date.

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#### EXAMINATION BY THE COURT

Questions by a member, Captain Osborn:

Q. Admiral Ramage, did you give more attention to the THRESHER than you do to the FBM's?

A. We have not had an FBM in overhaul.

Q. I mean in her PSA?

A. I think we did, yes. On the FBM's we have more personnel; we have two crews and more experienced people, and they are being given far more attention by SP, the Bureau and everything else in that regard.

Q. You do not mean to imply that more effort from your staff was being expended on the THRESHER?

A. That's right, from our point of view, from my staff.

Q. Would you be surprised if on sil-brazed inspection that--the UT inspection--the THRESHER received less than half the inspection that the SKIPJACK did in terms of ultrasonic inspection, and less than four per cent of a visual inspection; that is the ratio of THRESHER to SKIPJACK; would you be surprised at those figures?

A. Well, I think it is a little surprising, perhaps, but under the circumstances, as I stated, I don't think that these inspections, up to this date, or the inspection procedures, are adequate to prove very much. I think the visual inspection, yes; that's about the only thing you've got.

Q. Your staff has appraised you of the fact that we've never had an ultrasonic joint fail that has been previously passed, on shock test; have they not?

A. That's right, but a lot of tests, ultrasonic tests, which indicate poor joints, neither have they failed; have been rejected, neither have they failed.

Q. Well, you would say that one that had passed the test would have a better chance of passing?

A. I agree. An ultrasonic tested joint, I think, if it passes, is certainly going to be a good joint, and will certainly result in a "feel safe" situation.

Q. One thing that I was concerned with, with respect to the SKIPJACK and THRESHER tests was, Admiral, that the Submarine Force, to a great extent was paying for the SKIPJACK, and a lot of the tests involved in terms of THRESHER's PSA will be ship's funds. I should think that a test involving that scope should have been brought to your attention, from the standpoint that you are ultimately going to have to test them anyway.

A. This is hindsight; this is pure hindsight. I was not aware of this situation as being as sensitive, and I don't think anyone was. I'm sure that my staff didn't specifically make an issue of the sil-brazed joints in the case of either the THRESHER or the SKIPJACK, because this actually happened before my watch.

Q. Well, there's never any question with respect to you and your money problems involving hindsight; you always have a problem with those, don't you?

Unclassified

A. Well, it if's serious enough, we get the money. I would not say that money is the question here; if we need it we can get it, insofar as marine safety is concerned.

Questions by a member, RADM Daspit:

Q. Admiral Ramage, you spoke about the inadequate number of nuclear trained people on your staff. Do you have sufficient EDO's or other line officers in the materiel section of your staff to do the work and ride herd properly on such things as the ultrasonic testing, or things of that nature?

A. I think we have been very fortunate in having some excellent EDO's on the staff. There certainly is no question in my mind that they are the most loyal, dedicated, hard working people I've ever seen. However, we are reaching a point where we are running out of these people, and with all the work that we are having coming up we are not going to be able to maintain our standards, either on the staff or in the Shipyard, without additional help in this area. Just recently a replacement for Krag, who was lost on the THRESHER, was nominated. He is a graduate of this six weeks school here at Portsmouth, for whatever this amounts to. He has never had any experience with nuclear submarines, as far as I know. He has spent all his time on the conventionals down in Charleston. He is a very personable chap, as far as I know; a very knowledgeable, smart, capable officer, but he has not the experience to take the place of Krag. How long it will take to get that experience I can't say, but this is the type of officer, although he is also a smart, fine, young officer, he does not have the requisite background that we expect to have in an officer when he joins the staff.

Q. My question was directed more to numbers, if you like.

A. I don't know of anybody who says he's got enough help, and certainly, the amount of time and effort these people devote to their jobs, they certainly could stand more assistance. I would be glad to have, and could very well use more assistance on the staff in the engineering end.

Q. Have you have an opportunity to review the trial agenda that the Commanding Officer of the THRESHER prepared before he went out on trial?

A. Not in detail; we now have two officers reviewing the whole procedures. They are sitting down to reviewing them, revising them, bringing them up to date, and eliminating some of the unnecessary items in there, such as opening the garbage disposal unit and covering it at test depth.

Q. It appeared that he planned to make two test dives, the first one of two hours duration, in which he was going to go right down with no stops indicated. We know he made some on the way down, and he planned to come to periscope depth and then make a six-hour dive, during which he was going to test bulkhead flappers, watertight doors, main salt water valves, and auxiliary salt water valves on the second deep dive. This might have resulted in a case where he went down and found out he was unable to operate his salt water valves. Is your review considering the procedures involved in this?

A. Yes.

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Q. This may be out of your field, but there has been some question in testimony we heard about the fact that the THRESHER was operating under a classified operation order, while the SKYLARK, having contact with the THRESHER, points given at which they would rendezvous, etc., was under an unclassified operation order. Could you tell us what the requirements are for operations of a nuclear submarine?

A. That's beyond the field of my competence at this point.

Q. Going back on another subject, to ultrasonic testing of joints, I interpret the testimony I have heard up to date to indicate that while the ultrasonic test may occasionally condemn a good joint, it will not pass a joint that is bad. The Bureau has set a standard of forty per cent average bond, with not less than twenty per cent on one side. Do I gather from your testimony that you consider this test is not good enough to determine the adequacy of a joint?

A. No, sir; I agree with you as you stated the situation. However, as of last Friday, we had a conference that was called by the Bureau of Ships, at my insistence on the subject, and the outcome of the conference, as I understand it, they raised the minimum bonding to sixty per cent and intend to take this down to joints a half-inch or greater.

BY THE PRESIDENT: Admiral Ramage, the art of ultrasonic testing is recognized by the court as being of recent development. We have had testimony which would lead us to believe that it started in the Portsmouth Navy Yard, about March of 1962. Shortly after it became a going process, the test procedure here, the SKIPJACK was given an ultrasonic test of her silver brazed joints. Counsel was honest in his statement of percentages, but I think in fairness that I should correct the impression that he may have left with you regarding those percentages. There were 1120 joints visually inspected, of which 97 failed on visual inspection. Of these 97 which failed on visual inspection, 59 were considered good enough to try to get back by ultrasonic tests. Of those 59, 29 failed the ultrasonic requirements. Therefore, it is a little unfair to include those 29 in a compilation which assumes they came from 59 joints, because they actually came from a selected bunch of bum looking joints. But between the hull and the backup valves on the SKIPJACK, they ultrasonically tested an additional 116 joints, of which 24 failed to meet the requirements, and then in addition to that, there was a miscellaneous group of 109 joints, of which 18% failed to pass the requirements, but if we disregard the 29 which failed to meet the requirements out of the 59 bum joints, by visual inspection, we still, though, have a failure rate of valves taken at random, as it were, of 19.5%.

I know the subject of ultrasonic testing is new. I know, however, that it has been developed a great deal in the short time that it has been in use. The estimates by those versed in its use, and who have been witnesses before this court, would lead one to believe that it can be depended upon within about 17%. In other words, if you allow a plus 17% to the minimum required for a safe joint, then you would be very likely to have a good joint out of <sup>X</sup> plus 17% bond providing that you had the bond on both lands. It is, thus far, the best method of testing silver brazed joints. Welded joints are not without their defects. Welded joints cannot be tested to a gnat's hair either. The same joint, inspected by two separate teams with radiograms, will be in one case said to fail,



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and in another case said to be all right. The percentages of <sup>dis</sup>agreement on welded inspections is even higher than on ultrasonic tests.

As Deputy Commander, Submarines Atlantic, you have many serious problems. The court recognizes that this is a very rapid change in technology, a very rapid change and increase in complexity of submarine design and operating consideration. It is not the purpose of this court to add unnecessarily to your worries at this time, but we do desire to get from you as much accurate information as we can regarding matters which may have, if corrected in time, prevented the THRESHER loss, and which might in the future prevent another loss, and I'm sure you wish to cooperate with us in this. Silver brazing is not the only possible cause of the THRESHER's loss. There are such things as flexible couplings. There appeared not to have been any failure of the hull, but there could even have been a sinking, perhaps, without a flooding from the outside. The most likely thing, though, is a flooding source, not big, but not smaller, or not as small as a half inch. This, therefore, points to the possibility that there was a joint on the THRESHER that had been silver brazed, and which might have caused this tragedy.

This court has heard introduced before it a number of letters from the Bureau of Ships and from the operating forces which have taken note of previous difficulties with silver brazed joints. This court has found that a number of these letters were couched in urgent terms, and had they been followed implicitly, might have reduced the probability of a silver brazed joint having caused this tragedy by a great deal. The fact is, that until silver brazed joints were capable of being inspected by ultrasonic methods, there was no really certain way of determining how much bond, on which land, or both, one had after a brazer had completed the job. It leaves us with the feeling that when silver brazing testing by ultrasonic methods had become sufficiently usable to warrant the degree of use that we found in the case of SKIPJACK, and when we look at the results on SKIPJACK, which I have already stated for you, and when we consider the warning that was given by the BARBEL casualty and the investigation which followed it, the court would be entitled to hope that those involved in insuring the safety of our hazardous systems on our submarines, would not be too much influenced by the fact that a joint with a perfect geometric distribution of bond, of say 10%, is as strong as the pipe on which it is made. We would hope that that would not be allowed to decrease the effort to attain the standards of service by the Bureau of Ships, because it is probably this attitude, or this knowledge of a possible good joint being unfairly accused by not passing a certain standard of tests, that has caused some feeling of security where security may not have been warranted with respect to silver brazed joints. In other words, it has perhaps been a crutch for the fellow who is in a hurry to lean on and say, "Yes, the joint didn't pass the test, but it's a good joint still."

Questions by the president:

Q. In view of all this background, do you, in retrospect, feel that your staff was properly alerted by the BARBEL and the SKIPJACK and the other indications that they had of trouble with silver brazed joints,

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and remember the THRESHER went into overhaul just as the SKIPJACK came out, and the Bureau had indicated the desire that at least one ultrasonic team be used on her throughout her overhaul to the end that the maximum number of joints be tested? It is true that the Bureau did not stress alarm at the safety of the THRESHER, but it did express the desire to establish, by a good searching test of THRESHER's joints, establish a pattern for other ships, to give better dependence or a better sense of safety in their operations.

A. I agree completely with your philosophy and your thoughts on this subject, and I must say that this situation of sil-brazed joints has been given considerable thought and study. We have, of course, now been greatly concerned over the adequacy of the testing. We find that no two yards have the same standards, no two operators have the same capabilities. That was what was behind my comments that I didn't put too much faith in it. However, I do agree whole-heartedly that a good joint passed by ultrasonic methods is certainly the best test we have today and the art is improving, and we are taking adequate steps, I believe, or certainly immediate steps, to insure that standards are set throughout the shipyards; that adequate equipment is obtained, and that adequate people are trained, and that we get on with this testing. At the time of the THRESHER PSA, I will frankly admit that I was under the impression, and I think that most of my staff were under the impression, that there were adequate instructions, directives and requirements laid on the Shipyard by the Bureau to insure that this work was done and done properly. Now the question that we have to answer is where does my staff get into the picture; how far down in the Shipyard do we go ourselves, to inspect or ascertain what is the actual status of the work that is being done. At that point all I must say is that we depend on our commanding officers who have all this information. He knows the jobs that are laid down, the requirements; we lean most heavily on him to inform us at any time, day or night, if things aren't going to his satisfaction.

This is our flag; this is where we get into the act, if he is not satisfied, if he feels that the Yard. We have many conferences; we send many people to the yards to inspect; we sent our squadron commanders to the yards to inspect. We look at the administrative aspect, the planning program and the actual production. Now we have normally, at all times, ten to fifteen submarines under overhaul in various yards up and down the coast. I have a limited number of people; they are on the road practically all the time, actually visiting these yards, attending conferences, visiting the ships. It could be said that we should have spent all our time here looking at things; that we should have been alert to this report of so many failures versus the numbers that were inspected. These numbers did not come to my attention. I would have been--and I can't say as to how much came to Krags's attention, but he was, to my knowledge, on top of this whole situation.

Q. Well, Admiral, what this court wants to assure is that when there are indications of a need for attention at higher level of the command, both in the shipyards and in the operating forces, that these figures, or that those figures will come to the attention of those at the proper levels of command, to insure that sufficient cognizance is taken of the problem before the event.

A. I agree.

Unclassified

Q. And silver brazing is not the only area in which you have to be concerned, and this court fully realizes that it is impossible for you and your staff to get into the details of all of the repairs, construction and jobs in submarines in the Atlantic. You do, though, have a responsibility in insuring that you do get the information which is pertinent to decisions at your level, and I do not believe that at the present time these are being sorted out and synthesized enough to get the attention of people at the top level, in all cases. In the case of the silver brazing difficulties, I realize that there has been much "Wolf, wolf" in this area, and there has been a great deal of effort put on it, and there have been some tests that were thought to be the answer to the problem, which were later found not to be quite the full answer. It has not been an easy problem, but it is a matter of concern for the court that there were as many warnings after the sil-brazing plot did develop as there were, and that those warnings evidently did not reach the people at the higher levels, in the Shipyard here or in your command.

A. There is also the fact that we have had sil-brazed joints in submarines for many, many years. We have had them in submarines at least starting back in the war. All our submarines have had these joints over the many years, long before any ultrasonic testing, or other adequate means of testing, other than hydrostatic testing, and I think perhaps that a great deal more confidence has been placed in hydrostatic testing than is warranted; this is hindsight.

Q. I would agree.

A. But I am confident that the THRESHER passed all of her hydrostatic test with no trouble. Otherwise, she would not have gone to sea with any bad joints, from that point of view. However, we do know that these joints have now, since then, I have found out, that all sil-brazed joints have stood up under full one and a half times pressure, hydrostatically, and yet are not good joints; as a matter of fact they had no bonding whatsoever; they were held only with the flux, and this, of course, is a most serious situation, where a sil-brazed joint will, if it fails, in most cases, practically in every case, fail catastrophically, where a welded joint will not.

Q. Will start to leak?

A. Will start to leak. Here is the problem we face now, which has certainly been highlighted in no other fashion, that it has been as strongly highlighted as by the THRESHER, that such a casualty can occur, and we do have to look more closely at the sil-brazed joints. This, I feel, is the crux of the problem. We realize that they can fail; they have failed; so has every other--we've had the experience in every other casualty sometime or other. I don't think that the testing had impressed people to the point where they felt that this was the final answer on this. If it stood up hydrostatically, then it apparently would be satisfactory. This obviously was true in the Navy Yards; it was true among the ships' personnel, and probably true, to a certain extent, on the staff. I think we put too much reliance--obviously we put too much reliance on hydrostatic testing.

Q. And I do think that the fact that the sil-brazed material seemed to be properly distributed in a joint caused people to have more confidence in the joints that passed the standard test than they should have had.

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A. That's right. As I said, I've seen joints that had been stripped with 10% bond, there is hardly anything there, but they withstood four or five times full sea pressure, so this could be very misleading.

Q. I want to say a few words about your personnel problem. I think that when a commanding officer and an executive officer are both changed at the same time, just towards the end of an overhaul, it does create a situation that is undesirable. Now I understand why this happened in this case, and I understand also, as I have discussed this with people who should know, I understand that more people were left on the THRESHER who had been on there for a long time, in order to not add to the problem created by losing the Captain and the Exec at the same time. You had three officers on board who had been on for a long time, since the commissioning, and they were all highly regarded officers. You had about 70% of the old crew on board, and I agree with your estimate; probably you had a better crew in the THRESHER, all told, than you have on the run of the mill of your nuclear boats, but the fact that this ship had been out of service for six months, and those two new officers came aboard, the Commanding Officer and the Exec, and the fact that despite the high percentages of old men being left on board, there were new people being fed into the crew during this period, and the fact that this was an extensive overhaul, I think that much as we like to give the Commanding Officer full rein, and not check on him too much, I think in a case like that, you are asking an awful lot of one Lieutenant Commander, to be alert to everything that pertains to this ship, including something like the overall testing of silver brazed joints. I have a feeling that he was so snowed under during that three months period--he had a new Exec, getting jobs finished that appeared to be lagging, getting the new personnel trained, and all those things, it seems to me that we are asking an awful lot from a young commanding officer.

A. Are you inferring that he got no help?

Q. No, I'm not inferring that he got no help; I know that you had Krag up here.

A. We had his whole squadron up here, Andrews, Bellah, SUBDEVGRP TWO, his administrative staff commander, were also waiting on them hand and foot.

Q. They have that responsibility, but did anyone of them go to bat to get his silver brazed joints fixed up?

A. They had an interest in that, too. There is a chain of command here too, you see.

Q. I'm fully cognizant of that.

A. We are frequently chided because we go direct and not through the chain of command.

Q. I recognize this. I do not say that you personally should have done this, but I do have a feeling, as a result of these hearings, that this young Commanding Officer and his Exec, both highly qualified and highly regarded professionally, but I do think that they were faced with many problems, and that in the forest of many problems, they failed to see a tree here and there, and maybe something was left undone.

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A. Well, I think you are putting your finger right on the nerve of our problem today, that these youngsters have not got the experience nor the background that we would like to have, or what we have stipulated that we should have, and which we are not getting, and the situation is getting worse, and it's going to get a lot worse in this particular area, before it gets any better. This is the reason why we have continuously complained and set forth our problems to the Bureau. We have gone into this situation, detailed it right down to the last number and date, and we are just not getting the help. I think that if this is the way you feel, and it's pretty much the way I feel, that perhaps pretty soon we had better lay up these ships, rather than operate them. We are building more than we can operate with the personnel today. We cannot, today, stand the loss of any single commanding officer without going into a complete daisy chain; we go into a merry-go-round every time one man steps off. It isn't just a question that we have somebody in the bullpen warming up that we can put in. We don't have any spare pitchers in this game, not a single one; we have to bring somebody in from left field, or some other place and put him in to pitch. We don't have--everybody is in the game at this time.

Q. This is part of the reason why the Exec and the Commanding Officer of this ship were both released at the same time?

A. That's exactly right, and I can cite many more horrible examples of the same order, and I'm sure that we haven't seen the last; I know we haven't, but writing letters and objecting does not get the job done. We are not getting any better off, and as we have now, with more and more ships coming down the line, these people out at sea in command of these ships, are getting not only tired mentally, but they are getting tired physically, too. You can't keep these people on the treadmill forever.

Q. What are you doing with your personnel who are not eligible for command of these nuclear boats? After all, you are approaching a nuclear submarine Navy. What are you doing with those who have not come <sup>thru</sup> to the engine room?

A. I say that several have been forced off the boats by virtue of an officer junior to them being advanced to the job of Executive Officer. Therefore, these men have to come off; they are the Weapons Officers, Navigators, and the like. As such we have been able to put two of these men in command of conventional boats; others have gone to shore duty and training, as team trainers.

Questions by a member, RADM Daspit:

Q. For the record, could you state the different policies of manning SS(N)'s and manning SSB(N)'s, so the record will indicate the difference?

A. We require now that the Commanding Officer and four other officers be nuclear trained and qualified in submarines as a minimum for the SS(N)'s. SSB(N)'s, I think the Commanding Officer, the Executive Officer--we have other stipulations also, not only should they have so many but the Skipper should have had at least an XO's job on an SS(N) and/or preferably command of a conventional. There are many other caveats other than just the numbers. The main problem has been in the area of the SS(N)'s, however, and since it has been the practice to assign SSB(N)'s nuclear trained and submarine qualified officers as follows: Commanding Officer, Executive Officer and five others on the SSB(N)'s. On the SS(N)'s,

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one less, Commanding Officer, Executive Officer and four others. Originally we required all officers on the SS(N)'s to be nuclear trained, so we have been forced to come down repeatedly and reduce our requirements, just by virtue of lack of officers.

Questions by the President:

Q. What quality of officer have you been able to get into the forward end of the ship when they know that they will not be allowed to succeed to Exec or Command?

A. Well, I think that they are all fine, excellent officers; they wouldn't get through Submarine School if they weren't. From all I've been able to ascertain, by and large, most of them have worked in very well indeed.

Q. Are you having as many applications to Submarine School as you wish?

A. We were falling way behind; we were way behind a year ago. I organized motivation teams, sent them out into the field. With Admiral Smedburg's permission, we were permitted to invade all our basic training centers, our technical schools, "A," "B," and "C" schools, our NROTC units, and also we have been into over fifty high schools and colleges in addition, plus innumerable interviews on radio and television. We have got the recruiters themselves, the classifiers, and these other personnel procurement officers, and the response has been magnificent. We are getting them in by the droves. We are going to be overwhelmed this Summer. Whereas the best we've had in the basic classes has been 200, we will have some basic classes, three or four basic classes this Summer, over 500. We don't know where we are going to hang them in the barracks. The officers, I think, are tighter, but we are now taking all direct input, with maybe one or two exceptions, all direct input either from the Naval Academy or NROTC, and they are split out, I think, in four sections; of the two, one goes to Submarine School, one to Nuclear Power School, reverse, and then do the same again, so we have, around, I think, will have pretty close to six hundred.

(b) (6) relieved (b) (6) at this point as reporter.

Q. But you did say that your situation was getting a little desperate before you were given this unlimited poaching license?

A. That's right. We were some 1700 men, and I don't know how many officers, behind. We were retrogressing not only in overall numbers, but also in qualified submarine personnel.

Q. But what is this unlimited poaching license of Submarine Force doing to the rest of the Navy?

A. Well, it's not helping the Navy one little bit, I can assure you, unless all of these people are equally good.

Neither counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject

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matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness made the following statement:

**THE WITNESS:** I feel very strongly that we have got to rely on the integrity of all the people we have in the Submarine Force, in the Shipyards, the Bureau, people everywhere connected with submarine construction and operation problems, but what I fear most, I think, is being stampeded into a lot of precipitous action, such as rigging our ships with all sorts of safety devices, quick-closing valves, and other gimmicks, so that we will have the machinery plant rigged like a pinball machine, so that anybody that turns around quickly in one direction will set it off on tilt. I think that mainly, and most importantly, we have got to insure the integrity of our material, that we have the highest possible grade of material, the highest standards in workmanship, and certainly the highest requirements in inspections. I think that what we want to strive for most is simplicity, rather than a lot of complications and automation and what-not. We have built good ships before. We are building good ships now. I am sure we all have the utmost confidence in them. Naturally, this casualty, this tragedy in the case of **THRESHER**, has shaken us all tremendously, and we have learned a tremendous lesson at a tremendous price, but nobody designed it that way. Nobody intended it that way, and we all would have knocked ourselves out to prevent it had we known that there was something that we had overlooked. But this is one of those things, that any piece of machinery has its weaknesses; any operator has his weaknesses. People still get killed on roller skates and bicycles. So it is not unreasonable to feel that we have to exert even more care and vigilance while operating something as complicated and complex as a submarine. But I would make a plea certainly to all hands to double up our precautions and try to move in the direction of simplicity rather than complexity.

**PRESIDENT:** I am sure that this court is quite mindful of the danger involved in throwing a searchlight on one part of a complex problem and thereby blinding people to other parts that are also important. We are also quite mindful of the harm that can be done if a stampede is started in any direction. We will assure you that we will strive not to do these things that will make your task any harder.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court adjourned at 1755, 14 May 1963.

TWENTY-EIGHTH DAY

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Wednesday, 15 May 1963

The court met at 0845 hours.

All persons connected with the court who were present when the court adjourned were again present in court. RADM Palmer, a party, and his counsel waived their right to be present at this session of the court.

No persons not otherwise connected with the inquiry were present.

The court was cleared, and the members of the court and counsel for the court met in executive session.

The court opened at 1400, 15 May 1963, and announced that this session would be held with open doors.

All persons connected with the inquiry who were present when the court was cleared were again present in court.

No witnesses not otherwise connected with the inquiry were present.

Captain Frank Andrews, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry, was advised of his rights under Article 31, Uniform Code of Military Justice, was duly sworn, and examined as follows:

COUNSEL FOR THE COURT: This is an open session of the court, Captain Andrews, and members of the public are present. For that reason, classified information may not be divulged here. If, in your judgment, the answer to any question put to you by a member of the court or counsel would require the inclusion of classified material in the reply to make it complete, you will not answer the question but will so indicate instead.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, grade, organization, and present duty station.

A. My name is Frank Andrews. My grade is Captain, U. S. Navy. Present duty station is Commander, Submarine Development Group TWO.

Q. For how long has that been your command?

A. Since June of 1962.

Q. Briefly, what were your command functions and responsibilities with regard to THRESHER as they existed on and before 10 April 1963?

A. Well, THRESHER was a unit of Submarine Development Group TWO, and I was the Unit Commander.

Q. What were your responsibilities and duties with regard to the units of your command, such as with THRESHER during her post shakedown availability period?



A. I was responsible for the administration of the ship. I was responsible for the operation of the ship at times when it was under my operational control.

Q. And was THRESHER under your operational control on 10 April 1963?

A. It was not.

Q. What is your naval and professional background and experience?

A. I am a graduate of the Naval Academy Class of 1942. I was two years in destroyers during World War II; two years in submarines. I went into submarines in mid-1944, and have been in submarines ever since.

Q. What sort of duties have you had in the last ten years?

A. In 1952 I was at the David Taylor Model Basin, having just completed a command tour as Commanding Officer of the U.S.S. HARDER. I was Project Officer for the ALBACORE at the Model Basin, following which I was assigned to SubPac as PCO instructor. I commanded a division. After that I went to the Naval Academy for four years. I was head of the Science Department there for three years. And I came to the Development Group last year. This covers the ten-year period.

Q. "PCO" instructor refers to duty as an instructor in a course for prospective commanding officers?

A. That's right.

Q. Have you been connected with the search operations for U.S.S. THRESHER since her loss?

A. I have.

Q. Would you summarize for us the nature and extent of that search and the results to date?

A. The search actually started on the late afternoon of the 10th of April. At that time, as the senior submarine officer on the scene, I was in charge until the arrival of Admiral Ramage the following morning, when he assumed command of the search phase. On Friday, the 12th of April, on order from COMSUBLANT, he turned the search phase back over to me, and I have been the search commander since. When he left the scene, he left with the request that we commence a fathometer search in an area which was 10 miles by 10 miles centered at the point called datum, 65 degrees west and 41 degrees. 45 minutes north. At that time we had JEFFERSON, REDFIN, ROCKVILLE, which is an EPC, and a command ship, the WARRINGTON, which I was aboard. There were some other support ships also. There was an ASR there, but without a fathometer. We mapped the area out in such a fashion that we put a fathometer on top of every square yard of the search area. We had no guarantee that the LORAN-A would be effective.

Q. Would you explain that for us, please?

A. The LORAN-A is a device built to use radio techniques, but you can't get your position any closer than a mile and a half. Based on the first search, we were able to produce a fair idea of what the bottom contour looked like. We were able to produce some six points which we classified as posits - that is, possible THRESHER hull posits. This area was revisited by a second ship in this group, and as a result there were six points that looked pretty good. This was ATLANTIS. I guess I should have mentioned previously when I delineated the ships in the area that ATLANTIS was with us also when we took over.

Q. How do you find a "posit" with a fathometer?  
"posit"

A. The depth of the water is 8500 feet. The beam width of this fathometer is something on the order of 40 degrees. You transmit down with sound, and the echo comes back. If the THRESHER hull is within that range, you look for something on the order of 30 or 35 feet above the flat bottom. The echo is weaker for that point than the bottom, and it doesn't look as dark as the bottom, and the echo is on the order of about 200 yards this way and 200 yards that way - not because THRESHER had these dimensions but because of the side lobe effect of the fathometer. As you move closer, you wind up with a trace of about 200 yards long. Our experts were the Woods Hole Oceanographic people, who were aboard ATLANTIS, and who had done a considerable amount of exploring the bottom. As far as I knew everybody is pretty much of an amateur in connection with that area.

The second part of that search phase was to get ATLANTIS to make a picture of whatever was causing this echo. The technique for taking a picture at 8500 feet is well thought out and is a very easy operation. It is a simple technique, and they produced a picture of an area 30 feet by 35 feet long. So our hope was to come up with a couple of points, find the possible hull posits, and put ATLANTIS on top of that and get a picture. But it didn't work out because of the difficulty of getting a picture. In order to get a satisfactory picture, the camera must be 30 feet from the spot from which it is taking a picture. If you can imagine being up in an airplane 8500 feet high with a string and a camera on the end of it, the currents moving back and forth disturb the positioning of the camera, which is supposed to be within 30 feet of the subject, you can imagine the difficulty involved in trying to take a picture under these circumstances.

Q. Did weather impede this phase of the search operation?

A. At times, but not too much. Sea state was pretty good for quite a number of days. In the meanwhile, CNO had established a Technical Advisory Board, consisting of a number of civilians well known in the field of Oceanography and underwater sounds. The senior Naval officer is Captain Bishop from CNO, and their job was to advise COMSUBLANT on things to do. One of the first things they advised officially was that we ought to terminate the search phase which we were conducting and do a search that would be far more accurate in terms of navigation, and that is the use of DECCA and LORAN CHARLIE operations which were initiated. We outfitted the search force, which consisted of the CAPISTRANO, the--

Q. What sort of ship is that?

A. It is an ex-tanker, now converted to a search vessel. There also was the ALLEGHENY, which is a former fleet tug, now converted to a research vessel; the ROCKVILLE, an ex-EPC, now used as a research ship, and the PREVAIL, which is an ex-minesweep, now used by SERVLANT for whatever SERVLANT wants the ship for. Those four ships were outfitted with DECCA and LORAN CHARLIE, and we were to research the entire area with precision fathometers, each with two goals: (1) Make sure we put a fathometer on every square yard of that area; and (2) get a very accurate contour of the bottom. In the meanwhile we utilized the CONRAD, a civilian research vessel, and the GILLIS, which is an MSTS oceanographic vessel operated by the Oceanographic Systems, each of which is outfitted with oceanographic equipment. This was meant to utilize all means to follow up the hull posits in the search.

Q. In what way?

A. When you sweep over an area, you might have eight or ten things that look like the THRESHER. Now, you have to go in and inspect each closely and eliminate the ones that you know are not THRESHER. That is the phase we are going into now, and to do that, you can't do it with fathometers, because the fathometers produce the base in the first place. The tools which are being

employed, are a magnetometer, which can be towed 30 feet off the bottom, a TV camera, and a regular still camera, and a deep-echo sounder, which is nothing more or less than a small sound head which can be attached to the camera head and pinged sideways, similar to a sonar device on a surface ship. It is nothing more than a VDS when you come down to it.

Q. What is a VDS?

A. Vertical directivity sonar, or vertically directed sonar.

PRESIDENT: Variable depth sonar.

THE WITNESS: Variable depth sonar. Thank you very much.

A. (Continued) So those are the tools that will be used to follow up the posits we have now. We have six or seven posits which look like the THRESHER, provided the THRESHER will return a ping to the fathometer. If it doesn't, we are going to have to use something else.

Q. In connection with that, what have you found out about the nature of the bottom in the area of the search?

A. I have here a chart, which you are welcome to have, if you like. Unfortunately, it isn't a large scale chart. (The witness produced a chart of the ocean where the search is being conducted, and it was examined by the members of the court.) Admiral, this is the area of our operation; just to orient yourself, this is Cape Cod; Portsmouth is up in here; and Halifax is up in here. The area we are operating in is this area right here (indicating on chart). That is datum. Datum was established because that was the position of THRESHER when SKYLARK received the last transmissions at 9:17. There was also some oil found about a mile to the east of that. I made a statement some time ago that we were using DECCA navigation. Well, the DECCA green lines run like so (indicating on chart) through this area. The LORAN lines run through like so. This is the area that we have covered thoroughly with precision fathometers. We have made sweeps north-south, 250 yards apart. The DECCA green line permits you to stay on the line. Once you have found a position and a green reading, you can tell somebody else to go to DECCA green 4080, and you'll find the position. The next phase we are going into is the dropping of the submarine hull TORO in this area here (indicating on chart). We are seeking to use every tool at our disposal, precision depth recorders, a sonar that pings out sidewaves in an SQQ destroyer, and see what sort of an echo TORO will give. They will drop TORO on Tuesday. Based on that information, we are going to have an operational test of just where we are going from here. Now, to answer the question, this area over here (indicating) is rather smooth, over here to the west, and it gets smooth over here in the area to the east. It appears that the chances of finding THRESHER with fathometers over in this area are low. The chances of finding THRESHER to the west are very high.

Q. In the second phase of the search which you have described, was the weather an adverse factor so that the efficacy of your search was affected thereby?

A. Well, the search has been going on for almost a month, and I would say there were two bad days out of that month.

Q. What is your evaluation of the completeness and effectiveness of the search in covering the area to be covered?

A. Right now I think we have covered the area as close as anybody can do with the navigation that we can get out there. Whether the fathometer is an appropriate search tool in some of the terrain that exists out there is a question for argument.

Q. Do you feel that the efforts we are expending to locate THRESHER could be aided in any way by tools we are not now using and which are available to us?

A. No. I think we are using all the tools that we can get our hands on at this time. As a matter of fact, for everybody's interest, the people carrying the load in this are the civilian oceanographers. They are all high-grade scientists. We have practically captured the whole community of oceanographers, from directors right on down. Of course, many of them are Government supported.

COUNSEL FOR THE COURT: Mr. President, I have questions on other subjects not related to the search which are of a classified nature. I have no other questions at this time on this subject.

PRESIDENT: Are there any questions by the court?

#### EXAMINATION BY THE COURT

Questions by a court member, RADM Daspit:

Q. The area you did not mention was whether there are buoys or not. Do you have a buoy down there?

A. Admiral, we have about four buoys down. Two buoys were put down to measure current at the surface. Those buoys are not taut wire buoys; they are secured with nylon line and they are free to move around. When a couple of blows came by, they drifted out. Two taut wire buoys are anchored thoroughly, and the wire is just long enough to reach the surface and no longer. I said "wire." I should say "nylon." These are used for close-in survey work. If you want to work in an area 2 by 2, for instance, you can use that as a fix for relative navigation.

Q. What is the maximum range to which you can navigate around the buoys?

A. Ten miles, providing your radar has the proper frequency.

Neither counsel for the court nor the court desired to examine this witness further during the open-door session of the court.

The president of the court informed the witness that he was privileged to make any further statement during the open-door session covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The court was then cleared of all persons not connected with the inquiry, and the following proceedings were held behind closed doors.

Captain Frank Andrews, U. S. Navy, the witness under examination in open court, continued his testimony as follows:

#### REDIRECT EXAMINATION

Questions by counsel for the court:

Q. Captain Andrews, turning now to the period of THRESHER's post shakedown availability period; in your capacity as Commander, SUBDEVGROUP TWO, were you in an analogous position to THRESHER to that of a squadron commander?

A. Yes.

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Q. What was the command line that existed up and down from THRESHER to her type and operational commanders?

A. I will divide the responsibilities that THRESHER had in two ways: (1) operational and (2) administrative. THRESHER was completely responsible to me, and I to her, for all administrative matters. Following the administrative line up, I am responsible to COMSUBLANT and his deputy for administrative matters. Following the operational line up, THRESHER can be responsible to any number of people for operations. If it is an exercise in which THRESHER is doing SS(N) work versus SSB(N) work, as she has in the past, then I, as COMSUBDEVGROUP TWO, have been the operational commander for such an exercise, in which case THRESHER would be responsible to me. I, in turn, would be responsible to COMSUBLANT. In this particular case THRESHER was on a trial after a post shakedown availability, and she was responsible for operations to COMSUBLANT (ADMIN) at Portsmouth, who, in turn, was responsible to COMSUBLANT Operations in Norfolk, Virginia. Everybody, of course, is responsible to Admiral Grenfell in the chain of command.

Q. Speaking of the operational chain of command and your use of the phrase in this case, you were referring to her sea trials, were you not?

A. Yes, I was.

Q. I was still in the post shakedown availability period, and there was no operational chain of command activity at that time, was there?

A. No.

Q. Activity in the sense that she was conducting operations under a particular command?

A. I should qualify my remarks relative to the administrative line in the case of a ship in overhaul. There are many decisions that are made that have to do with a shipyard overhaul: the way the funds are spent, the type of job that is done, which completely bypass the Squadron Commander and the Shipyard right directly to COMSUBLANT, who has delegated those responsibilities to his deputy.

Q. How would you particularize your function with respect to THRESHER during her post shakedown availability period?

A. Well, I certainly was responsible for whether Commander Harvey was ready to go to sea as an officer, that he had an adequate wardroom on board. I certainly was responsible, along with other people, to see that he had enough enlisted men; I was responsible that he trained himself well enough before he went to sea. Those responsibilities were mine.

Q. Yours in the first instance?

A. Yes, after his.

Q. Would you then give us your analysis of the personnel situation in THRESHER at the end of her post shakedown availability period?

A. I would like very much to read a prepared statement, if no one will object. In answer to that question, my statement will cover, first, the operational readiness of THRESHER's officers and crew as individuals and second, the operational readiness of THRESHER's crew as a team.

THRESHER's Commanding Officer, Lieutenant Commander Wes Harvey, was known to me mainly through conversation at Submarine Development Group TWO Headquarters. Since he took command of THRESHER in the Shipyard, I did not have an opportunity

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to go to sea with him. My evaluation of Lieutenant Commander Harvey, from conversations, from his service reputation, and from his record, which I have studied, is that he was in every way an outstanding naval officer with a great deal of nuclear submarine operating and engineering experience. I had no personal knowledge of the remainder of the wardroom, except for brief official conversations with Lieutenant Commander DiNola and Lieutenant Commander Garner, and brief social introductions and conversations with the remainder of the wardroom. I did have an estimation of all these officers from their records, and on their records, they all looked good. I am sure these records are available to the court. Over-all, I considered this group under Lieutenant Commander Harvey capable of taking THRESHER to sea and performing successfully.

One note which might interest the court is this: In the late fall of 1962, several months after I relieved as COMSUBDEVGROUPO TWO, there was issued COMSUBLANT letter, serial DEP N2/01323 of 16 November 1962. This letter required that squadron commanders inform COMSUBLANT if the wardroom of any nuclear submarine fell below six officers qualified both nuclear and in submarines. In this letter an officer was considered to be qualified in submarines if on board twelve or more months, including yard time. Since THRESHER did not meet the requirements of COMSUBLANT, I so reported to him in writing, stating that as of November, 1962: (2) Only five of the required officers were on THRESHER, and (b) the Commanding Officer and Executive Officer were to be relieved prior to sea trials. Actually, when THRESHER went to sea on April 9, 1963, she had seven officers qualified both nuclear and in submarines, as defined in the COMSUBLANT letter referenced before. In addition, her sonar officer, Lieutenant Smarz, was also qualified in submarines, although not qualified in nuclear power.

However, I would be less than honest if I did not report a certain misgiving which I had, as follows: THRESHER shared in the same problems which have been reported to me as plaguing most of our ASW nuclear submarines. These problems are: (1) The turnover of officers on the ASW nuclear submarines has been rapid; (2) The total amount of actual at-sea time in submarines amongst officers on the ASW/SSN's is low.

Specifically on THRESHER there have been three Executive Officers since commissioning in August, 1961. Specifically on THRESHER it would have been better if either the Commanding Officer or Executive Officer had participated in a <sup>b(1)</sup> test dive before. Ideally it would have been better if on board THRESHER there had been, in addition to the Commanding Officer and Executive Officer, four other officers who had one year actual at-sea experience and were qualified nuclear. There were only three, one of whom was not nuclear qualified.

No one can say with facts to substantiate their case that this over-all problem which I mention: (a) rapid officer turnover, and (b) small amount of at-sea experience amongst many SSN officers, had anything to do with THRESHER's accident. However, I am sure that one of the purposes of this Court of Inquiry is to make recommendations to the Chief of Naval Operations which will prevent another THRESHER incident. I strongly urge that one of the recommendations be as follows: The amount of actual at-sea submarine experience amongst officers on submarines like THRESHER must be maintained at a level above where it is now. Provisions must be made to slow down and stagger the relief of key personnel aboard each ASW/SSN.

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Q. Have you ever made those recommendations before?

A. I have never made those recommendations before in writing.

Q. Were your misgivings such that --

A. Mr. Counsel, I would like to continue on, if I may with my evaluation of the chiefs and --

Q. I would like to question you at this point with reference to the officers.

A. Right.

Q. Were your misgivings such, before she put to sea at the end of her post shakedown availability, that you actually had a fear for the safety of the ship and its crew?

A. The only action I took was the letter which I quoted. I was told what the standards were. I ascertained that one of my boats was not up to those standards, and I submitted this letter. When the boat went to sea, she had exceeded those standards. My misgivings had to do with a period prior to her going to sea. The day the THRESHER went to sea, I felt those people were perfectly capable of doing their job. This statement I made about a rapid turnover does not relate to the THRESHER incident at all.

Q. Your misgivings are the result of hindsight and did not exist on the day she went to sea, is that a fair statement?

A. No, that is not a fair statement. The misgivings about a rapid turnover I've had for some time, and so has everybody else in the Submarine Force.

Q. Misgivings with regard to the need to have officers with longer at-sea experience...

A. That's right.

Q. ..were what, the result of hindsight, or did they exist the day she went to sea?

A. They existed before she went to sea.

Q. Would you please continue with reference to the enlisted personnel situation?

A. Concerning chief petty officers, 14 chiefs were assigned and 13 went to sea. Of these 13 chiefs, ten were in the THRESHER commissioning crew. It would appear that the manning level of chief petty officers was excellent.

One chief petty officer, WISE, had been given a letter of commendation from the Secretary of the Navy as a result of a casualty in which THRESHER lost power, including battery, diesel and nuclear. Specifically, he had been commended for "restarting THRESHER's propulsion plant" after the propulsion plant shut down. It is believed that Wise was Senior Chief at the THRESHER propulsion panel during her accident.

Concerning THRESHER's enlisted complement, I have these facts to report: (1) A rough prepared by C.O., THRESHER, and used as the basis for a readiness report to be submitted by CONSUBDEVGROU P TWO to COMSUBLANT was received by my office in mid-March, 1963. It indicated only two rating shortages below allowance. These were a shortage of one petty officer radioman and one storekeeper. On the basis of this manning level, CONSUBDEVGROU P TWO reported personnel on THRESHER as excellent in the readiness report to COMSUBLANT. (2) The actual details of

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THRESHER's crew sailing on 9 April were: 98 on board, allowed 85; 70 qualified in submarines; 39 in commissioning crew; 43 reported on THRESHER before 16 July 1962.

Q. What was your evaluation of THRESHER's personnel as a team?

A. Concerning the state of training of THRESHER's personnel as a team, the following facts can be reported: On 28 February 1963 -- Correction. I will start again. In April 1962, my predecessor, Captain Zurcher, gave THRESHER an Operational Readiness Inspection. The over-all mark assigned was Excellent. During this inspection Lieutenant Commander DiNola, Lieutenant Commander Lyman, Lieutenant (jg) Henry, ten of the thirteen lost chief petty officers, and thirty-nine of the eighty-five lost crew members were aboard.

Number 2: On 28 February 1963, Commander Harvey reported in a monthly report to me, "We have started an officer training program for all OOD's on emergencies and casualties, Rules of the Road, and General Watch Standing Principles, before taking the ship to sea." In another monthly report submitted 31 March, he reported that during March the following drills were carried out -- and I have to get them out of this other suitcase here. This is a monthly report submitted in March just before getting ready during March, the following drills were carried out: There were 1,2,3,4,5,6,7,8,9,10,11,12,13,14... they were 17 in number, of which collision, flooding, and fire are included. The other ones are the usual drills that people run in submarines, such as helmsman drills, lost lube oil, and so forth.

1 April Lieutenant Commander Harvey wrote to me in a monthly report which he submitted: "We finished the last day of our alongside training cruise this morning, and I feel that it was most successful. I believe the officers and crew completely competent to take the ship to sea for trials, but I fully intend to walk before we run in the conduct of the trials." That is the end of the quotation. I have that letter if you want to see it.

Q. Yes, I would like to see it, please.

A. Do you want it right now?

Q. You can finish your statement, if you will.

A. All right. I had had several conversations with Commander Harvey in which I assured him of my support, if needed, so that he might get ample time at the end of yard overhaul to check out his ship and crew before going to sea. Commander Harvey told me he had also received a phone call from Captain Zurcher, of DEPCOMSUBLANT Staff, stating the same support.

A salvage inspection was given to THRESHER by the Commanding Officer of the TINOSA on 29 March 1963. All deficiencies associated with safety of ship were reported corrected before the ship went to sea.

Q. In addition to your having learned the number of drills conducted on board THRESHER, such as collision, flooding and fire, which you have mentioned, did you have any information as to how the crew was able to perform its drills as a



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team? Did any of your officers inspect her and observe those drills?

A. We did not.

Q. To clarify the record, where was your headquarters located during THRESHER's post shakedown availability period?

A. At New London, Connecticut.

Q. Would you produce that letter which you mentioned?

A. Yes.

The witness produced a letter from the Commanding Officer of the U.S.S. THRESHER dated 1 April 1963, and it was submitted to the court and offered in evidence by counsel for the court.

There being no objection, it was so received and marked Exhibit 208.

The court waived the reading of Exhibit 208.

Q. Captain Andrews, was your knowledge of the readiness of THRESHER's personnel to meet the demands of operations at sea as a team based solely on your information about the individuals who made up her officers and crew and reports which you received as to the number of dives or drills and other training conducted during the post shakedown availability?

A. The information I have just given you was the major source of my knowledge about THRESHER. In addition, however, I had had a number of conversations with Commander Harvey. He called on me frequently down in New London. My staff was in constant communication with the Commanding Officer and the Executive Officer. The Material Officer was in constant communication in keeping tabs on the progress. I had, from time to time, the assurance that THRESHER was doing all right.

Q. Do you feel that members of your staff had an ample opportunity to observe the THRESHER's crew on the spot in their ship?

A. I think they had as much an opportunity to observe THRESHER as any other squadron commander observed any other ship in overhaul.

Q. What reports did you require from the members of your staff as to the progress of THRESHER's post shakedown availability and the demonstrated capabilities of her personnel?

A. None other than the ones I read off to you that had to be prepared for Submarine Development Group and the required information from the ship.

Q. Did you also require oral reports from your officers who visited THRESHER?

A. Yes.

Q. With what frequency would you estimate your officers visited THRESHER during her post shakedown availability period?

A. The Material Officer visited THRESHER three times. I myself visited her once. I can't answer that about the Chief Staff Officer.

Q. When did you visit THRESHER?

A. Late September or early October. It was before Commander Harvey took over. I was up here for the Change of Command, but I did not inspect THRESHER at that time.

Unclassified

Q. Could you discuss the nature and extent of the participation of your command in the conduct of the work performed on THRESHER during her period of post shakedown availability?

A. As to the quality of work being done, my staff had no way of ascertaining that and took no steps to ascertain that. We depended on the ship completely for a statement as to whether the quality was good or bad. As to the time sequence of things being done that had to do with the delay of the overhaul that had to do with reports made to appropriate staff members of COMSUBLANT, and my staff acted as a major link in presenting those things to the interested people at Deputy COMSUBLANT. To sum up in terms of quality of work: We did not look at it at all really. As to the time sequence and getting the work done, we were very intimately related to that.

Q. You say as to the quality of work performed, you relied on Captain Harvey and his people to inform you?

A. That's right.

Q. I presume you meant that to include the fact that if there was anything which did not suit him or which concerned him about the nature or quality of the work performed, you would rely upon him to get in touch with you?

A. That's right.

Q. Did he get in touch with you with any complaints of that nature?

A. One case I remember is the BQQ sonar which was experiencing problems associated with electronic cooling, and we were concerned with the same problem in TULLIBEE, so we included him right in the same program of getting his problem fixed up. He had his fast cruise stopped with some 200 items left to go, and he wrote a letter to the Shipyard in this regard. We got a copy of that letter. We did nothing about that because the Shipyard went ahead and did all the work. My people were concerned with what the Shipyard would do, and the Shipyard did this.

Q. You did check to see that he was being helped by the Shipyard, did you not?

A. Somebody on my staff did, yes.

Q. Do you feel that the total skill and experience of the members of your staff could have assisted Captain Harvey in determining the quality of work on his ship?

A. I don't think they were in the position that his own people could not do equally well or better. My staff is in the nature of an administrative staff to see that he got the job done. We had to depend on the wardroom officers to pinpoint their problems.

Q. What information did you have as to how Captain Harvey was functioning in the areas you have mentioned?

A. Well, he wrote me a monthly report, and he gave me verbal reports on his problems as they appeared, and much more to Commander Bellah by telephone.

Q. Did the effect of all of these convince you he had the situation in hand and had the necessary capacity for performing the function of monitoring the quality of work performed in the ship?

A. Absolutely.

Unclassified

Q. Captain Andrews, were you aware of the fact that, during THRESHER's post shakedown availability, there was an incident in BARBEL on 30 November 1960, which was investigated by a Board of Investigation the following April, and which showed that there was a failure of a joint in BARBEL traceable, at least in part, to the use of wrong materials in the joint, and which gave rise to serious consideration as to the quality of silver-brazing performed in her during her construction period?

A. I was not.

Unclassified

Q. You were not aware of this during THRESHER's post shakedown availability?

A. No.

Q. When did you learn about it?

A. I learned about it this morning from my Chief Staff Officer. He apprised me of the situation that there had been a BARBEL problem but that the Board of Investigation report was not disseminated. He also apprised me of the fact that there are several letters which have to do with sil-braze joints, all of which indicate that, if properly made and properly inspected, they are supposed to be better than the parent material. That is the sum and substance of my knowledge on sil-braze joints. I can make this statement concerning the -- This is what had been reported to me, but I wasn't aware of what was going on previously. This was reported by my Staff Engineer.

Q. Were you aware of the fact that SCULPIN was found to have defects in her silver-brazed joints and that the matter was looked into on the west coast at Mare Island in the period 11 to 13 November 1961?

A. No, I was not.

Q. Were you aware of the fact that during SKIPJACK's recent overhaul in the Portsmouth Naval Shipyard just prior to THRESHER's post shakedown availability, a significant percentage of sil-brazed joints which were tested by ultrasonic means were rejected?

A. No, I was not.

Q. Did you know that when THRESHER went into her post shakedown availability, and pursuant to the instructions of the Bureau of Ships, a Job Order was issued requiring that a minimum of one ultrasonic testing team be assigned during the entire period of her post shakedown availability to test to the maximum extent possible the silver-brazed joints which had been made during her construction period?

A. I personally had no knowledge of that letter.

Q. How much did you know about the work to be performed in THRESHER during her post shakedown availability?

A. I depended very heavily on my Staff Officer's and Chief of Staff to follow the details of THRESHER's progress. I got into the big picture. I was not in attendance at the post shakedown availability conference. My staff Material Officer was. He gave me a report.

Q. What was his name?

A. Lieutenant Ullman.

Q. Did you have a representative on board THRESHER when she put to sea after her post shakedown availability?

A. I did not. Lieutenant Ullman was to be that man, but he could not make it because of a commitment in HARDHEAD, and an officer from SUBLANT's staff went instead. I told Commander Harvey to keep everybody off the ship that was just going to be a rider and who was not going to help him get a better overhaul. I felt this was a time when the skipper did not need anybody around who is not going to help him out.

Q. When did you discuss the sea trials with Captain Harvey?

A. We discussed them periodically right after he relieved command.

Unclassified

Q. Did you ever discuss the actual sea trials with him when they were finally crystallized?

A. The details, no. The major portion of our discussions was that -- as I have said before, I told Commander Harvey that because of the delays in the overhaul, because of certain things that had happened, the Shipyard Commander had been called to task by the Bureau of Ships, and because of this, there would be a certain amount of pressure brought to bear to get him out on time; and I advised him that he must resist that pressure in order to get the proper and safe work performed before he went to sea. He assured me that whenever there was pressure brought upon him, he would resist it.

Q. You deduced that there would be pressure exerted, from your own previous experience?

A. Yes.

Q. Did you ever detect any such pressure?

A. The Shipyard overhaul was delayed, I think, three or four times. The Shipyard Commander was called down to Washington and appeared before the Chief of the Bureau of Ships to explain why the delays were encountered and to explain the excessive costs involved. I don't see how the Shipyard Commander can come back from something like that without exercising some expediency to insure that it was done in a fashion wherein he is not going to spend more time and money and without exerting a certain amount of pressure.

Q. Did you detect this pressure?

A. I can't honestly cite instances. I can make one statement concerning one incident that occurred during the beginning of the fast cruise. Planning was going on from day to day, and there were some hot words exchanged between the boat officer and the Ship Superintendent. What his name was I don't know. That was the only incident I know of.

Q. Did you or any member of your staff get word from any officer on board THRESHER indicating pressure being placed on them to hurry the departure of their ship from the yard?

A. I had conversations with Commander Harvey. I can't quote the exact words that were said, but from his conversations, I would say that the yard was anxious to get the job done, and he was anxious to make his ship clean and safe and ready to go. There was a certain amount of friction. I don't say it was an unusual amount of friction.

Q. That situation obtains quite frequently when a ship goes into a yard?

A. Every overhaul I've been associated with.

Q. And this did not seem inordinate compared with your experience in other overhauls?

A. I don't think so, no.

Q. When did your headquarters receive the agenda for THRESHER's sea trials?

A. Saturday, the-- It was the previous Saturday, prior to their sailing.

Q. Saturday, the 6th of April?

A. That's right. They were lost on Wednesday. It was the previous Saturday.

Unclassified

Q. Did you see the agenda on the 6th?

A. I did not see the trials agenda. It was seen by Commander Bellah, my Chief Staff Officer.

Q. What did he check it over for?

A. To see if it complied with all COMSUBLANT asked for.

Q. Had you received a report from him as to the results of his review?

A. I have received a report, but it was after the THRESHER was lost.

Q. Were you at your headquarters from the 6th to the 10th of April?

A. I was in the New London locality, yes.

Q. Did you or your staff take action to insure that SKYLARK had a copy of the sea trial agenda?

A. We did not take that responsibility. I think that is more properly the Shipyard's responsibility to give them a copy.

Q. Were you aware of the fact that SKYLARK had been detailed as escort for THRESHER.

A. Yes, I was.

Q. Had you ever discussed with Captain Harvey his plans for making his first deep dive after coming out of this Shipyard?

A. No, I did not.

Q. Did you know that he had never made a deep dive of this sort before?

A. I knew he had been on 700 foot boats. I never actually looked into whether he made a b(1) dive or not.

Q. What did you feel was your responsibility with reference to assuring yourself that the agenda which he undertook for his sea trials was proper, in accordance with current directives, and provided a reasonable degree of safety considering the evolutions to be performed?

A. Well, it is written by COMSUBLANT that the Squadron Commander is supposed to check it over, and someone on my staff did, my Chief Staff Officer.

#### EXAMINATION BY THE COURT

Questions by a court member, CAPT Nash:

Q. Captain Andrews, do you have any details of the THRESHER casualty which resulted in the commendation to Chief Wise?

A. Not with me, Captain Nash. I can tell you off the top of my head basically what it was. They had shut the nuclear plant down. They were low on battery and had counted on the diesel engine to charge the battery and then go critical. Unfortunately, the diesel engine went out of commission for a longer period than they expected, and it would have taken a couple of days to get it fixed up. There they were with a low battery, the reactor not critical, and a diesel engine out. But I'm getting out of the realm of my knowledge, but it was my understanding there was no power to circulate water through the reactor.

Unclassified

Q. The reactor shut-down was a self-imposed casualty, however, was it not?

A. No. I think there was a SCRAM of some sort, without having planned it, and then a diesel casualty, so that it was important to get power back in order to start circulating the water through the reactor.

Q. You don't recall the reason for the SCRAM?

A. No, I don't.

Q. In your testimony regarding enlisted personnel on board THRESHER, I believe you stated that 39 of the enlisted personnel below the chief petty officer level who participated in the ORI in the spring before the post shake-down availability were still on board at the time of the sea trials after the post shakedown availability?

A. I believe that's correct.

Q. Do I understand, then, that we had roughly a 50 per cent turn-over in this area in less than a year?

A. Yes.

Questions by a court member, CAPT Osborn:

Q. The 39 was exclusive of chiefs, wasn't it, Captain?

A. That's correct.

Q. Wasn't it 13 chiefs plus 39?

A. Yes. The 13 chiefs were on there for the ORI.

Q. The only other period that we've had an expansion as fast as we have in submarines today was in the period 1950 and 1951, when we had to establish 33 crews in a year. During that period we got enough qualified officers on submarines. Do you think the number of officers we have on submarines, qualified officers, is inconsistent with the expansion we are experiencing today?

A. I didn't realize that the expansion you mentioned took place in 1950-51. I thought the expansion that took place of that magnitude was in 1942-43. There was quite an expansion at that time. But to answer your question, do I think that the procedures followed today are inconsistent with what took place in 1950, if I compared the number of qualified officers today with the number of qualified officers in 1950 and 1951? My answer is this: A THRESHER class submarine is worlds different from that wonderful battery submarine that we had fought a war with. In my opinion, this is a new Navy. It is a complex Navy. It does things that I myself did not grow up with. There are problems facing these youngsters that I never faced - with deep dives and high speeds. I think the educational program that they go through before they get these jobs is ideal. I think the amount of college education they have demanded is outstanding. I merely make this point, since with a complex vehicle like the THRESHER class, you can stand an awful lot of at-sea experience to keep yourself out of trouble. I'm not just isolating THRESHER. This is true of all of our SSN's. I don't believe that they have the at-sea experience that they should have. Whether they can have it and we still have our Navy or not, I don't know. I'd like to see them have more at-sea time before they get to be Executive Officers and Commanding Officers, or third and fourth officers of these various ships.

Unclassified

(b) (6) relieved (b) (6) as reporter at this point.

Q. Do you think the turn-over rate in SSN's is higher than it is in SSBN's?

A. I don't know.

Q. In conjunction with your other ships that operate with you, say the TULLIBEE, have you investigated casualty control procedures, particularly control of flooding, to your satisfaction?

A. My staff has looked into it. Since April the 10th, I have been out on Latitude 41.45 North, Longitude 65.00 West continuously. My staff has looked into it. The TULLIBEE, of course, along with all other submarine fleet boats, is now limited to five hundred feet. To the best of my knowledge, there is a study going on as to what we will do when we go to five hundred feet and what sort of speeds we will have on when we go there; whether we will or we won't hover. Those things have been discussed and are being discussed in every SSN in the whole Submarine Force, Pacific and Atlantic.

Q. I was referring to the period prior to this, Captain. Had this been the subject of study and had the problem more detail than just the superficial observation of going to deep depths been a subject of study?

A. No, sir. I have never been in a wardroom on a submarine and heard people talk about flooding at deep depths. I have had several conversations with Commander Axene. One conversation, in particular, was relative to a letter which he had submitted to the Chief of the Bureau of Ships, which I believe <sup>is in your records</sup> ~~is in your records~~. This conversation was incident to a discussion concerning something that I feel very keen about, which is the loss of stern planes at high speeds at deep depths. I am sensitive about this because of my ALBACORE past. I tried to get Commander Axene to be excited about this problem because I was looking for ammunition to build up a case for ALBACORE and for other submarines, and he told me point blank that he was interested in this as a problem; but that there was a problem far more pressing as far as he was concerned, and he showed me the letter, or I had the letter in hand, and the letter said that the greatest single problem on THRESHER is the literally yards and yards of salt water piping throughout the ship. That was the extent of my discussion with--well, I take it back. We discussed that several times afterwards. But I'll be very honest to say that neither one of us said to ourselves, "What are we going to do while we're waiting to get this problem squared away by BuShips?".

Q. Now, in that connection, have there been safety studies prior to 10 April or after 10 April on a recent conversion of the ALBACORE?

A. There have been, prior to 10 April, a number of studies conducted on ALBACORE in order to prevent possible damage to ALBACORE should she lose stern planes when she's in her high speed evolutions. There's been a running battle, as a matter of fact, going on between myself, BuShips, Deputy, and the Shipyard, and the battle is not so much what we are going to do, but will we do something; and, to my knowledge, it's gradually being resolved. The problem of ALBACORE's loss of speed at deep depths hasn't been one to get everybody excited as the loss of speed at deep depths on THRESHER. There's quite a difference. But this problem on ALBACORE's loss of stern planes is one that we've been discussing for six or seven months now.

Q. This problem with respect to the new conversion gives them a higher sustained speed than they ever had before; isn't that correct?

A. Absolutely. And they're operating in the same depth strata that they've been operating in since their inception, six hundred feet.



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Q. How do you feel from a standpoint of just your personal experience and the tools that are given to you, and I know you have an excellent spectrum of this, being an outstanding sonar specialist and with your sonar technical background--how do you feel about your general education in the field, across the board, in all the major systems of, say, the THRESHER?

A. I don't believe I follow that.

Q. I mean, to make a real contribution with respect to the officers in handling their systems, in terms of this vast expansion, in terms of operational techniques, safety--I just feel, what tools are given you other than your own time in terms of studies, in terms of better acquainting yourself with the problem--and I know it's a tough one? I just want to know how you feel about it.

A. Well, I believe that you're referring, for example, to the situation with the QQ-2, where all of a sudden you're getting a tremendously complex system and it's being dumped on their shoulders, young fellows who have a good college education but hardly any other education in systems engineering. And that will be true of SUBROC, and it will be true of the Mark One-Thirteen system, the ASTER Torpedo, and on and on and on.

My answer is this. There are two solutions. We can either highly specialize people and make them systems engineers and let the Captain go up the command line and be a Commanding Officer; or we can try to get more people into the program and slow the thing down so that a young man, when he gets a THRESHER class submarine, stays with it long enough to get something out of it. Those are the two solutions. I think the answer probably lies halfway in between, but we try to do both.

Q. Do you think the really big problem of making the THRESHER any real operating submarine still lies there?

A. I still do. I think you've hardly scratched the surface on how to use that submarine effectively.

Questions by a member, RADM DASPII:

Q. Captain Andrews, in regard to the schedule of trials prepared by the Commanding Officer of THRESHER, and whether it was supplied to the SKYLARK, I understood you to say that you thought this was the Shipyard Commander's responsibility. Are you of the opinion that the Shipyard Commander, for a ship which is not new construction, has any responsibility with regard to preparing the trial agenda?

A. As a matter of fact, now that you bring it up, I think I'm wrong. Frankly, I don't know; but I would think, now that you've brought the point up, that the Commanding Officer who is responsible for preparing the agenda, like all people who write letters, is also responsible to see that the info addressees also get copies.

Q. In reviewing that agenda, it appears that the Commanding Officer planned to make two deep dives, one of short duration, two hours; then a second one of six hours, during which he expected to operate all of his valves; which, to me, implies that he did not expect to operate his valves on the first dive. This is of some concern to me. Have you discussed this at all with your staff?

A. I have only discussed with my staff the fact that there were the two dives. I looked over the trial agenda and, like you, I came to the

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conclusion that the first dive was to get down and back, nothing tested out; and when that was done satisfactorily, then the next dive would be a more methodical dive, stopping at each of these spots down and checking the various pieces of equipment that had to be checked.

Q. Going now to the search operation--when you went out to take charge, whom did you relieve?

A. Nobody, Admiral, because I was the first senior submariner on the scene. Then Admiral Ramage came out about six or eight hours after I did and he relieved me.

Q. Hadn't the Commanding Officer of the SKYLARK been operating as the search commander?

A. I believe he was, yes, sir. I stand corrected. I actually relieved him. There was a certain amount of confusion. Yes, he was established as the search commander by COMSUBLANT and I relieved him. And I can recall sending a dispatch to him, "Am on the scene. I now assume the responsibility of the search party."

Q. There's no question in your mind, then, that you did assume it from him?

A. That's right.

Q. I note that the OpOrder issued THRESHER was a classified Operation Order. The Operation Order issued to SKYLARK was not. There is some concern as to what the directives are for the operations of nuclear submarines. We have been unable to clear up this point. Can you clear it up for us?

A. I'm sorry, I can't.

Questions by the president, VADM AUSTIN:

Q. Captain Andrews, you have spoken of the highly complex nature of SSN's; you have spoken of the lack of adequate time at sea of the officers of SSN's. In view of both of these, and in view of the fact that the Commanding Officer of the THRESHER and the Executive Officer of the THRESHER relieved in January and the ship was due, at that time, to go out a couple of months later after a long time in the Shipyard, do you not think that it was asking a good bit of the Commanding Officer to be completely responsible for the details of his test dive and various other things that you and other members of your staff might have assisted him with a little more? In other words, you have had at sea time; officers of your staff have had at sea time; and my question is: Why did not you and your officers more thoroughly look into the agenda for his deep dive?

A. Admiral, I can only say that at the time it seemed like a pretty good idea, that we were doing what we should be doing. Right now, I agree with you that if I could have it to do all over again, I would sit Wes down and discuss the whole matter of the deep dive. Along with a thousand other submarine officers--hindsight, yes; foresight, no.

Q. In your conversations with Captain Harvey, did he at any time mention the program of inspection by ultrasonic testing of the silver-brazed joints in his ship?

A. We never personally talked about that, Admiral. There was a program established at the conference for the post shakedown availability. The ship --it was not Commander Harvey at that time, it was Commander Axene--requested that all of the sil-brazed joints be inspected, and there was a hassle

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between them and the Shipyard, the Shipyard pointing out that there were too many joints. At that conference my Materiel Officer was present. The agreement finally was that the Shipyard would test those that had parted during the shock trials down off Key West and those which were between the hull stop valve and the hull, and that's all.

Q. You referred to the discussions and views on this subject as a "hassle." Did Captain Axene or anyone else seek assistance at the squadron level, assistance in getting a more thorough inspection of these joints?

A. They did not seek my help or the help of my staff. If there was anything done, then it would have been by Deputy SubLant. I have no knowledge of that.

Q. How many officers do you have on your staff, Captain?

A. Eight.

Q. Of these, how many have had experience as officers on SSN's or on SSBN's?

A. None. My Materiel Officer is a former enlisted man, qualified on nuclear submarines, a graduate of the AEC Program for enlisted men; has worked at the plant out at Idaho, not only as a student, but later on as a participant. He subsequently went to a battery submarine and qualified as an officer. He is an outstanding officer. I depend very heavily upon him for advice to me in nuclear matters.

Q. Do you think that you need on your staff at least one officer who, as an officer, has operated in and qualified in nuclear submarines?

A. I certainly do. I think that the Submarine Development Group, which has the mission of developing tactics for this type of submarine, ought to have an ex-Commanding Officer on its staff.

Q. Have you made representations along these lines to higher authority?

A. Honestly, I have not, because there are no ex-Commanding Officers available. They're all driving SSBN's around, or doing equally important jobs in the nuclear field.

Q. But if you do not make your needs known, how will they ever be satisfied?

A. I agree, Admiral.

Q. Captain, I know the words, "silver-braze," are an athema to many people these days, but I would like to inquire as to your knowledge and concern about silver-brazed joints prior to the loss of the THRESHER.

A. Admiral, I certainly would be dishonest if I said I had as thorough a knowledge of silver-brazed joints as I do on the things that were going on in my boats in Sonar and Fire Control. I just knew that silver-brazed joints existed. I knew that they were a source of concern. I knew that Captain Axene had kicked here at the Shipyard about silver-brazed joints. And that was the extent of my knowledge.

Q. You were not aware of the fact that some of the silver-brazed joints which had passed normal hydrostatic tests had later been found to have failed?

A. No, sir, I was not.

Unclassified

#### REDIRECT EXAMINATION

Questions by counsel for the court:

Q. Captain, you referred to a letter written by Captain Dean Axene of THRESHER. I show you Exhibit 111 before this court. Is that the letter to which you refer?

A. Yes, that's the letter.

Q. What is the best deep current and deep bathythermograph information that you possess for the area in which THRESHER was lost?

A. The source of my information on the bathythermograph conditions were the ATLANTIS measurements made a couple of days later after April 10th.

Q. How deep was it?

A. Right to the bottom, eighty-five hundred feet.

Q. Can you provide us with the specific information that you obtained from them?

A. I can describe it now if you'd like.

Q. Fine.

A. There are two meeting currents, the Labrador Current coming down from the north, and the Gulf Current coming up from the south; and they, depending on the time, will create on the surface either a cold situation or a relatively warm situation for about the first one hundred feet, could be two hundred, could be fifty. There is a continual change between water which is almost freezing and water which is about twelve degrees Centigrade above freezing, or maybe thirty-three to about forty-two, in that first fifty to a hundred feet, so that you have this situation, or you can have this situation (the witness outlined two types of curves with his hands). Below that it gets warmer down to about three or four hundred feet, and then it tails back and is sharply negative approaching freezing as you get to eighty-five hundred feet. So, my estimation, if THRESHER were at **b(1)**, she would be below a positive gradient; in other words, anything that went up would, undoubtedly, go right back down. And I've told myself consistently that we ought to find THRESHER within four thousand yards of where SKYLARK was when she got her last message, because it had to be within the UQC range.

The current is tidal in nature, which oceanographers tell me means it varies periodically. If you can think of the current as being a vector, the vector goes around in a circle; sometimes it's southeast, sometimes it's northwest, sometimes it's east, sometimes it's west. It's always of the order of one to one and a half knots at the surface. There is a controversy going on now as to what takes place as you go deep. The Navy oceanographers say that the current right on the bottom is about a half mile per day going in the southwesterly direction. ATLANTIS recently made measurements, subject to error, which indicate the current is a knot going right down to the bottom. This has caused the TRIESTE skipper a great deal of concern because his SOA is one knot; so if you have a one knot current, he doesn't go very far. However, as he has pointed out to us, there are some beautiful pictures in a folder that Woods Hole has been passing out to people, such as Admiral Grenfell, and there are what you call "worm tracks" on the floor of the ocean. Worm tracks wouldn't normally be there if there's a current of a knot or more, so it might be that the TRIESTE is in good shape and the NavOceanal people are right, and that the ATLANTIS measurements are actually in error.

Unclassified

RE-EXAMINATION BY THE COURT

Questions by a member, CAPT Osborn:

Q. How big a negative gradient do you have from about **b(1)** feet down, Captain Andrews?

A. Well, from the pictures they showed me, Captain Osborn, at **b(1)** feet the temperature would be thirty-eight going back down towards thirty-two, so past **b(1)** feet it's already started back down negative, but up around five hundred feet it goes maybe seventeen degrees from five hundred feet, because, you see, it goes positive, then it gets over here (indicating with a sweep of his hand) and then there's a big negative gradient.

Q. If you started out at say a fairly good trim at four hundred feet, which we have indications to believe that THRESHER was at four hundred feet for some time, do you think by the time you got to, say, **b(1)** that you'd be back in trim from the standpoint of the gradients you've seen?

A. I couldn't begin to estimate that.

Q. Would you get back to about the same point?

A. It would be very difficult for me to answer that. You'd certainly go back in the right direction, but whether you get back there exactly, I don't know.

Q. How about between **b(1)**

A. Oh, it's getting colder all the time. I can get a more accurate statement for the court from the Woods Hole people on the BT. I have quoted this from some data that was brought over and laid on the wardroom table and I looked at it and now I'm quoting it to you. If you'd like more information from Woods Hole, I'd be glad to get ahold of it and write a letter and send it in to you if you'd like.

COUNSEL FOR THE COURT: Please do so. Then I can introduce it into evidence.

WITNESS: Now I gather from the question that you're interested in what could have happened with the trim down in the region between **b(1)**

I'll just pass this statement on. It's purely conjecture. It's conversation between scientists. There are those two meeting currents, and in addition to meeting in the horizontal, they also meet this way (the witness indicated a hump by a hand motion)--

Question by counsel for the court:

Q. In the vertical?

A. In the vertical, yes. So there is a possibility that--take a strip here of the ocean two miles wide and a strip over here ten miles wide--Strip "A," two miles wide, an expanse ten miles wide, then Strip "B"--that the gradients between those two spots is quite a bit different and that you could have had a very unusual situation down below **b(1)** That's conjecture. I have no facts to back it up. They were talking this way because of the possibility of THRESHER losing depth because of getting into a warm spot of ocean. No facts, no figures, they were just talking this way.

Unclassified

Apparently there is a situation like that in the Straits of Gibraltar. I'll get a more affirmative statement of BT readings from Woods Hole and mail it to you, or ask Woods Hole to mail it to you.

PRESIDENT: We have one letter addressed to the court by a scientist who, I believe, now to be on the Advisory Committee, and he pointed out the similarity which he believed to exist between this area in which the THRESHER was operating and the Straits of Gibraltar because of the two currents going in opposite directions and of opposite temperatures.

CAPT OSBORN, a member: We'd like to have from the standpoint of the oceanographic deal what they think the best profile is, together with the most pessimistic deviations that you can give.

#### REDIRECT EXAMINATION

Questions by counsel for the court:

Q. Speaking to the length of the search for THRESHER from its inception, to your knowledge, is this the longest search ever performed by the United States Navy for a lost submarine?

A. I don't know. I can make this statement. The British looked for three months before they found the AFFRAY. I think the American Navy ought to at least go three months.

Neither counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court recessed at 1545 hours, 15 May 1963.

The court opened at 1605 hours, 15 May 1963.

All persons connected with the inquiry who were present when the court recessed were again present in court.

No witnesses not otherwise connected with the inquiry were present.

Benjamin T. Bragdon, Jr., a former witness for the court, was recalled as a witness for the court, reminded that the oath he took was still binding, and was examined as follows:

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Mr. Bragdon, for ease of reference in the record, would you state your present position in the Portsmouth Naval Shipyard?

A. Yes. I am a Naval Architect with the Quality Assurance Division.

Q. Code 303A3?

A. That's right.

Q. Your name is Benjamin T. Bragdon, Jr.; is that correct?

A. That's correct.

Q. In your previous testimony you undertook to make a review of the records of hull replacement welding in THRESHER completed during her post shakedown availability, and to tell us whether it was completed and inspected in accordance with the directives of the Bureau of Ships and the Portsmouth Naval Shipyard. Have you made a review of the work so accomplished?

A. Yes, I have.

Q. What is the result of your review?

A. Well, I have the records, I feel, quite intact; and I have them well assembled by patch jobs, by various assignments, so that I can produce records for any specific job you might like to look at.

Q. As a result of your review of those records, can you now state whether or not the work was performed in accordance with the governing directives of the Bureau of Ships and this Shipyard?

A. Yes, I believe it was. Yes, sir.

Neither counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Unclassified

Richard J. McCormick, Jr., (b) (6)  
was called as a witness for the court, was informed of the subject matter of the inquiry and of his rights against self-incrimination, was duly sworn and examined as follows:

COUNSEL FOR THE COURT: Mr. McCormick, this is a closed session of the court and classified information can be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Would you state your name, address, and present occupation.

A. Richard J. McCormick, Jr., (b) (6)

I am a Naval Intelligence Operations Specialist, District Intelligence Office, FIRST Naval District.

Q. In connection with your official duties, have you undertaken to provide this court with a summary of the information possessed by the Office of Naval Intelligence with respect to the information held by that office concerning the possibility of sabotage or enemy action in connection with the loss of THRESHER?

A. Yes, sir.

Q. Would you please give us that information now?

A. A search of the District Intelligence Office, FIRST Naval District, files, and a search of the files of the Office of Naval Intelligence, Washington, D. C., has been made with respect to sabotage or enemy action with respect to USS THRESHER with negative results.

#### EXAMINATION BY THE COURT

Questions by a member, CAPT Nash:

Q. Mr. McCormick, do you have any information regarding shipping, relating to shipping in the area, that might be of interest to us?

A. Yes, sir. The District Intelligence Office was requested by counsel for the court that a search be made with regard to foreign shipping that might have been in the area on the date of 10 April 1963. This request was forwarded to the Director of Naval Intelligence, who, in turn, requested that this search be made; and as a result of that a Confidential message was received at the DIO from the Office of Naval Intelligence, which stated that on that date there were five Soviet fishing vessels in the area and one foreign merchant ship, namely, a Swedish vessel by the name of SVANEHOLM. The message also contained an offer to make a further search if the court so desired, and the DIO was informed as of this morning that no further search was desired.

Q. From your review of these ships, have you any reason to think that any of them might have been related to the loss of the THRESHER?

A. No, sir.



Unclassified

#### REDIRECT EXAMINATION

Questions by counsel for the court:

Q. You mentioned certain shipping "in the area". Can you state what that area was?

A. The area was within a hundred mile radius of the last THRESHER datum on 10 April 1963.

Neither counsel for the court nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

(b) (6) relieved (b) (6) as reporter at this point.

William J. Cowhill, LCDR, U. S. Navy, a former witness for the court, was recalled as a witness for the court, was reminded that his previous oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: Commander Cowhill, this is a closed session of the court and classified information can be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Commander Cowhill, will you state your present duty station?

A. My present duty station is with Deputy COMSUBLANT, New London.

Q. You have previously served on board THRESHER, have you not?

A. I have.

Q. Are you familiar with the facts concerning the incident which occurred in THRESHER and which resulted in the award of a decoration to Chief Wise, a member of the crew of that ship?

A. I am, yes, sir.

Q. Please relate it.

A. First of all, Wise was one of four men who were so decorated. The incident related to what is familiarly called the "b(3) 10 USC incident" and occurred on 2 November 1961. This was before my tour on board, but since I was an engineering officer on another ship I became familiar with it through the incident report system and having gone to THRESHER later, I

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became more familiar with it in discussing it with the people. On that date, 2 November, the ship came into San Juan and made a normal shutdown of the reactor plant. This was at about ten or 1100 in the morning. They had requested shore power but no shore power was available in that port so that they maintained their auxiliary load by means of the diesel engine.

b(3) 10 USC 130

b(3) 10 USC 130

This decision has been subject to criticism later on due to the fact that they only had one source of power, namely the diesel engine and the battery. The battery at the time of cooling down was at about three-quarters fully charged condition.

In the evening, approximately 1900, with only the duty section essentially on board, the diesel engine failed. It was believed that they would be able to start it back up within a matter of minutes, and they made several false attempts to get the diesel back on the line, delaying any effort to start up the reactor plant. While the diesel was down of course, all of the ship's electrical power was supplied by the battery. Initially they had something like a b(3) 10 USC amp-hour rate out of the battery and they went to reduced power and this came down to about b(3) 1 ampere-hour rate out. There was some delay, as I say, in making attempts to start up the reactor plant because they fully expected they could get the diesel back on the line. This expectation proved to be false and at b(3) 10 they commenced a pre-critical, and at b(3) 11 made some effort toward latching the rods. Meanwhile, seeing that they were getting in trouble on the battery, they started attempts to get power from another submarine that was also moored in b(3) 10 USC 130 a fleet boat.

In that they were at reduced power, this meant no air conditioning on board. The temperatures became unbearable on the ship, something in the nature of 110 to 130 degrees, and during all of the subsequent efforts to get the reactor started up the people were working under almost unbearable conditions. They almost made it. They had the rods up and they were critical and they began to generate steam, and they almost got the steam to the turbine generator--in which case they could have become self-sustaining--when the battery gave out and they lost all power.

At about 2315 they began receiving the power cables from CAVALLA and at 0200 they completed, and the power was then assured--power from the CAVALLA, that is. And with power assured from the CAVALLA, they made a normal reactor start up.

The important points are, there was no initial SCRAM involved. It was simply a case of putting the reactor plant in a somewhat tenuous condition with only the diesel as the real assured source of power.

Q. What were those decorations that were awarded?

A. I am not sure but I believe the four men received Naval Commendation Medals, and the reason they received the medals was their excellent work in the case of this very severe casualty.

Unclassified

EXAMINATION BY THE COURT

Questions by the court president:

Q. Commander Cowhill, I'm going to ask you questions on another subject while you are on the stand.

A. Yes, sir.

Q. While you were Executive Officer of the THRESHER, were you knowledgeable of the results of the tests of various joints on the SKIPJACK?

A. I was not, Admiral.

Q. Do you recall attempts by your captain to get more joints on THRESHER tested than were tested?

A. Admiral, I remember the arrival conference and I have been searching my memory trying to be very explicit about what position various people took in regard to the silver-braze inspection job. This, of course, was one of many jobs that was discussed and was not in any way the most important in the ship's force mind, but it was one of the jobs, however, that we did debate at the arrival conference. The belief, the best I can recollect, the ship's force came feeling that we weren't going to get enough in the silver-braze inspection and we were worried mostly about the joints which had failed during shock trials and been repaired by amateur people, if you would, or tender personnel and ship's force personnel, and had received essentially no test. We desired to have those joints very carefully looked at by the yard personnel and it was not clear in our minds, when we came to the arrival conference, that this was set up in the jobs. I personally was probably the most familiar of all of the officers with the ultrasonic testing business having been on SCULPIN. In retrospect, it is hard to say, but the other officers were not real concerned about the joints because we'd been so successful in shock trials. And I had talked to the commanding officer about some of our results on SCULPIN, and he put this forward at the arrival conference as a desire to get somewhat more in the way of ultrasonic inspection than was originally put forward by the Yard. So that I think that he was fully satisfied. I was fully satisfied, as were the other officers, with the compromise agreement that came out of the arrival conference in this regard.

Q. Was the subject of the failure rate of the joints that were tested on THRESHER, discussed with your relief?

A. No, sir, Admiral.

Q. Did you know the rate of failure to reach Bureau standards, of the joints ultrasonically tested in THRESHER while you were on board?

A. No, sir, I can't say I did, sir.

REDIRECT EXAMINATION

Questions by counsel for the court:

Q. Were you still on board when THRESHER learned of the decision not to unlag joints in an effort to extend the ultrasonic test?

A. Would you say that again?

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Q. I will rephrase it. Were you still on board THRESHER when information was received by THRESHER that the Shipyard had decided to conclude ultrasonic testing of the old joints without unlagging these joints?

A. I must have been attached to the ship at the time.

Q. Let me ask you the next question. Was any demonstration put forward by Captain Axene or other officers of the THRESHER to this decision by the Shipyard?

A. There was none to my knowledge.

Neither the counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court then closed at 1630, Wednesday, 16 May 1963.

The court opened at 1820 Wednesday, 16 May 1963.

All persons connected with the inquiry who were present when the court closed were again present. RADM Palmer, the party, and his counsel expressly waived their right to be present.

The court then adjourned at 1821 hours, Wednesday, 16 May 1963.

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TWENTY-NINTH DAY

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Thursday, 16 May 1963

The court met in executive session at 0830.

Present: All members of the court and counsel for the court.

The court opened at 0945 hours and announced that this session would be held with closed doors.

All persons connected with the inquiry who were present when the court adjourned were again present in court. RADM Palmer, the party, and his counsel expressly waived their right to be present at this session.

Captain John B. Guerry, U. S. Navy, a former witness for the court, was recalled as a witness for the court, was reminded that his previous oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, Captain Guerry and classified information can be divulged here.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. Captain Guerry, would you please state your name, grade, organization, present duty station and your job at the Portsmouth Naval Shipyard?

A. John B. Guerry, Captain, U. S. Navy, stationed at the Portsmouth Naval Shipyard as Production Officer.

Q. As a consequence of the BARBEL casualty, was a work order issued at Portsmouth requiring a material identification and review of THRESHER's vital piping systems?

A. Yes, it was.

Q. Would you produce the record of this material identification and inspection list.

A. Yes, I will. (Hands document to counsel for the court)

Q. Would you identify it please.

A. The first document was put out by the Production Officer preceded by four days the job order to inspect the material of sea water systems in new construction. This was followed by a job order from the Planning Department to check material of all ASW tubing for conformity to various references--material should be copper nickel; report any variance back to the Type desk. This was done.

The cited documents--letter from Production Officer and Job Order from the Planning Department--were offered in evidence by counsel for the court. There being no objection by the court, they were so received and marked as Exhibits 209 and 210 respectively.

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Q. What is the next report you have, Captain?

A. I've got various reports--documents--pertaining to what was found in the system.

Q. Do you have a summary of them also?

A. I do have a summary of what was done and these then point out the material that was found and there was some material that was the wrong type. In other words we had carbon steel where copper nickel should have been and we had CRES where copper nickel should have been. (Hands documents to counsel)

A group of five memoranda were then offered in evidence by counsel for the court. There being no objection by the court, the documents were so received and marked as Exhibit 211.

Q. Do you have an inter-office memorandum showing what materials were not inspected?

A. Yes, sir, I do. Here it is. (Hands document to counsel)

Counsel for the court then offered the cited document in evidence. There being no objection by the court it was so received, and marked as Exhibit 212.

Q. Can you tell us the extent of the visual inspection made at this time?

A. Approximately 1435 joints were inspected visually. There were two unsatisfactory joints found in the trim system due to misalignment. Those were the only joints being picked up as unsatisfactory. These were repaired.

Q. Do you have data as to which those two joints were?

A. Yes, I do.

Q. Can you describe them to us?

A. They were two three-inch ells. Piece F-27 on line--I think it is--P-7 and F-27 on line P-9 as shown on 1862780, Sheet 1. That's all. We also x-rayed some questionable joints, and of 20 joints x-rayed, we rejected three.

Q. Do you have a record of those?

A. Yes, sir. (Hands documents to counsel for the court.)

The cited documents were then offered in evidence by counsel for the court. There being no objection by the court the documents were so received and marked as Exhibits 213 and 214.

Q. Would you describe in detail this Shipyard's evaluation of sil-brazed joints in THRESHER's vital sea water piping systems which was accomplished subsequent to the BARBEL's casualty with respect to the reliance on the following as a basis for that evaluation: First, the years of successful use?

A. Well, before I answer these questions, there is one other in connection with the test program or trying to prove the reliability of the system. We did cut installed joints, and this test might leave a lot to be desired. However as a random sample, I think two were pulled out and that encompassed brazed joints. They were taken over as a test sample, put on the test stand, and tested to destruction. The first configuration failed b(1) Failure was in the pipe and the parent metal, so the brazed joint held. There were no indications of a sil-brazed joint failure. The second configuration failed b(1) The failure

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there was in the elbow. The elbow itself cracked. I think those were the only two samples we ran. We did similar tests on other ships at the same time with basically the same result. We sectioned these joints, found out what the type of failure was, but what we did not do was what was the per cent bond that went along with it. If you want that for evidence--

CAPTAIN HUSHING: It is in the record.

Q. Would you answer the question as to Portsmouth Naval Shipyard's evaluation of silver brazed joints in THRESHER's vital sea water systems after the BARBEL casualty, with respect to reliance on the years of successful use as a basis for evaluation?

A. Well the THRESHER had one year of operation and the understanding we had in the Yard, it was a year of fairly hard operation and considerable time at test depth.

Q. And you did use that as a basis in evaluating the silver brazed joints in THRESHER's sea water system?

A. Yes, we did.

Q. To what extent were hydrostatic tests used in your evaluation of her sea water system, the same system?

A. Well, prior to leaving the yard, but subsequent to her builder's trials, we used a hydrostatic test on various systems; in fact all salt water systems other than the trim and drain systems, the systems subject to sea water pressure. The test consisted of pressure rising, holding at pressure for a period of time-- five minutes--and then lowering the pressure off, building back up, holding five minutes, then lowering the pressure--in other words to simulate up and down. This was done for ten times, build up and let down, and the results of that were no failures.

Q. Do you have a record of those tests?

A. This is the DM, what was done, and I do not have other than the system was done; I do not have a record. That was the prescribed test there. (Hands document to counsel for the court)

RADM DASPIT: To what pressure was this done; what was the maximum?

WITNESS: I think this was b(1) sir.

RADM DASPIT: Just the normal test pressure?

WITNESS: Yes, sir, one and a half times.

RADM DASPIT: It is not the shot impulse?

WITNESS: No, sir.

Unclassified

The cited Design Memo was then offered in evidence by counsel for the court. There being no objection by the court, the document was so received and marked as Exhibit 215.

Q. You have already told us, have you not, of the reliance of Portsmouth Naval Shipyard, as a basis for evaluation of the systems, on the visual inspection of the joints and chemical identification of the joints?

A. That is correct. Approximately 1435 were visually checked.

Q. Can you now indicate to us on which systems impulse tests were conducted?

A. Impulse test was conducted on the trim and drain system, the complete system.

Q. Do you have records of those tests?

A. I have a technical report giving the results of that test.

(Hands document to counsel for the court)

The cited document was then offered in evidence by counsel for the court. There being no objection by the court, it was so received and marked as Exhibit 216.

Q. What mallet tests were performed on the systems?

A. Except for experimental work to see whether they felt the mallet test would tell them anything, it was not used. The general consensus was that the mallet test was an inconclusive test and it was not utilized.

Q. What ultrasonic tests were employed?

A. No ultrasonic tests were employed until the PSA of which I testified previously.

Q. On what shock tests did you rely in your evaluation?

A. Well, there were no shock tests performed at the Shipyard other than the bump test. However, I think this question more or less pertains to the result of the shock trials which the THRESHER went through just before it came in. There were 32 failures from the shock test, nearly all, if not all, in one-inch-and-below lines -- air and hydraulic primarily. I think there was one failure in a constant vent line. The type of failure -- although the fittings used were all insert-type fittings -- there was evidence that the insert ring had not been in at least two of these fittings, and the only reliance they had was from the face feeding. However, the majority of the failures were due to poorly hung pipe and also to tapered fittings which have, to the best of my knowledge, been eliminated.

Q. Referring to your answer to the question just previous to the last one, do you know what the Bureau of Ships evaluation is of the value of mallet tests in the case of ships which have already been operational for awhile?

A. I believe they determined that it was of marginal value, if any.

Q. Now you have already told us, have you not, the extent of the radiography conducted and your evaluation of it?

A. That is correct.

Q. To what degree did you rely upon your knowledge or your belief, that all joints in the piping from the hull to the back up valve were welded?



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A. Well, we knew they were not welded. The specifications to which the ship was built did not require it. In fact, this requirement for welded joints between the back up valve and the hull had just been invoked on this last -- this 1963 -- submarine contract. Prior to that time, there was a change order that did invoke it on all joints or fittings of three -- above three inches -- but below that, there was no requirement, so we knew we had fittings below three inches that were silver brazed.

Q. Did you conduct an inspection of them?

A. Yes, we did.

Q. With what reliance on the results?

A. I think I have reported that previously to you.

Q. When you were here previously, you were requested to bring together whatever records you had of the results of the ultrasonic survey of silver-brazed piping conducted here at the Shipyard in SKIPJACK during her last overhaul period. Do you have those results with you?

A. Yes, I do.

Q. Before you offer them to us, will you tell me what reports were submitted after that inspection to the Bureau of Ships, to Commander Submarine Force Atlantic Fleet, and to Deputy Commander, Submarine Force Atlantic Fleet?

A. I have been unable to find any evidence that we submitted reports to anyone, any written reports.

Q. Have you been able to find evidence that you submitted oral reports?

A. No, except we were authorized to perform repair work on the ones that were defective and apparently had to have SUBLANT's concurrence with expending his money for this. I do not have any other proof or evidence that we ever kept him informed of just what the total results of the inspection were.

Q. Would you produce the report of results of that survey of the joints?

A. Yes, sir. This is a summary report when this thing was completed. I submit it here. (Hands document to counsel for the court)

Q. This is an interoffice memorandum from Code 303B-2 of the Shipyard to 331 dated 4 April 1961, is it not?

A. That is correct. 331 was the assistant repair superintendent. There were copies sent to the ship and to the P & E type desk.

The cited document was then offered in evidence by counsel for the court. There being no objection by the court, it was so received and marked as Exhibit 217.

Q. Would you describe the history of this inspection of the silver brazed joints in SKIPJACK?

A. Yes, sir, I will. There was concern over the installation of short bosses in the salt water system, the reliability of these short bosses. We had a job order to renew all short bosses in the salt water systems of the SKIPJACK. To do this we stripped lagging off of all pipe systems upon arrival in the Yard. Simultaneously, with this request for the short boss job, we had a request to hydrostatically test, the salt water system.

Unclassified

Unclassified

Q. Who made that request?

A. This was from Deputy SUBLANT -- COMSUBLANT at the time, or Deputy COMSUBLANT. We did this, started off complying with this program of hydrostatic test and visual inspection, radiographing any that we suspected. And in January or February of '62 -- this was all authorized back in September of '61 prior to the ship's arrival in the yard which was, I think, in early January of '62 -- just about the time of her arrival, two other Shipyards, Mare Island and EB, had reported they were having reliable results with ultrasonic testing and we were asked could we undertake ultrasonic testing of these systems.

Unclassified

(b) (6) was relieved as reporter by (b) (6) at this point.

Q. Who asked that question?

A. Again, the Bureau, I believe; the Bureau and Deputy COMSUBLANT. We then sent people out to Mare Island in late February, in February, and qualified four people; they came back and held schools here and qualified people, and in late February or early March we started wholesale ultrasonic testing of the joints available. Our records at first were very scanty; we didn't keep complete records. In other words, we ran the crystal around and either rejected or accepted on the spot. Later we got a little more sophisticated and then did start keeping records of the joints, but I think I reported the other day that we did about 312 joints, we ultrasonic tested that many and I wanted to verify that figure, but the cards, giving section by section, we have 141 cards.

Q. At the time you performed the ultrasonic testing, which you are now describing, all the joints had been unlagged and remained unlagged?

A. That is correct.

Q. Have you made an analysis and a summary of the joints which were ultrasonically tested, and does it include any information as to the percentage of bond of those which were rejected?

A. Yes, I have.

Q. Will you produce it, please?

(The witness did so.)

The tabulation of the results of the ultrasonic tests conducted on the SKIPJACK during the 1962 overhaul was submitted in evidence, and there being no objection, it was so received as Exhibit 218.

Q. Does Exhibit 218 contain a list of all the joints that were rejected?

A. No, it does not.

Q. Please explain Exhibit 218 and in explaining it, explain the limitations of its coverage compared to the entire inspection made on SKIPJACK.

A. I would like to refer to Exhibit 217. Our total records indicate that we inspected, by ultrasonic means, 284 joints, of which we rejected 71, of which I have a breakdown and a card identification of only 141 joints, and a rejection of 27.

Q. Now would you describe and explain your analysis to us of Exhibit 218?

A. We broke down these rejections, the ones we had the records for, and which were done during the latter part of the inspection period, was broken down by size, the number of joints that were involved and the amount of rejects, and for each size then, we gave the average bond of the rejected joints, and also the lowest bond of those in the rejected category. For instance, in the two-inch size there were ten joints rejected; the average bond of the rejected joints was 37.3, the lowest was 29, so that whole group was barely under the 40% requirement, and possibly a good number of these were rejected because defective segments had an unbonded area, rather than an overall spread. In fact, I think you will notice under the two and a half size, we have rejected two joints with the average bond above requirements, but they were defective because of unbonded areas.

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Unclassified

Unclassified

Q. In gaining the information on which Exhibits 217 and 218 were based, did you develop any information which would lead you to believe that Exhibit 218 is representative of the results of the entire ultrasonic survey?

A. It would have to be supposition.

Q. Would you explain the final line on your pencilled table?

A. That is the number of rejects; this reject figure.

Q. There is nothing on this pencilled paper which is not on the type-written one?

A. Yes, this top line, showing the number of joints involved. The final line is the reiteration, the number inspected and the number rejected.

Q. Captain Guerry, did you also make a materiel identification inspection of SKIPJACK during her overhaul?

A. Yes, this Job Order, which, incidentally for the record, is Job Order 16-501-50602, requested a materiel identification. We did one; we examined 314 separate pieces and found no faulty or wrong materials.

Q. Who requested that a materiel identification inspection be made on SKIPJACK?

A. This was also a part of the Job Order request from Deputy COMSUBLANT.

Q. Have you been able to get certain inter-office memoranda of the Portsmouth Naval Shipyard at the request of counsel for the court?

A. Yes, I have.

Q. Would you produce memorandum dated 3 April 1963, the subject of which was flexible hose installation?

A. Yes, I will (the witness did so).

The cited memorandum was submitted to the court in evidence, and there being no objection, it was so received as Exhibit 219.

Q. Do you also have inter-office memorandum dated 14 May 1963, the subject of which is nondestructive tests for castings?

A. Yes, I have.

The cited memorandum was submitted to the court in evidence, and there being no objection it was so received as Exhibit 220.

Q. Do you have an inter-office memorandum dated 15 May 1963, subject, SS(N) 593 aeroquip hose; replacement of?

A. Yes, sir, I do.

Q. Please produce it.

(The witness did so).

The cited memorandum was submitted to the court in evidence, and there being no objection, it was so received as Exhibit 221.

Q. Getting back to the report of tests in SKIPJACK of joints which were rejected, can you testify that all joints which were found to be rejectable were in fact repaired and replaced with joints that were tested and found satisfactory?

A. To the best of my knowledge, they were.

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Unclassified

Unclassified

EXAMINATION BY THE COURT

Questions by a member, CAPT OSBORN:

Q. Captain Guerry, with respect to producing the records on SKIPJACK and on THRESHER, how difficult were they to obtain? I mean, did you have to do a lot of digging on them, or could you just ask for them, or could you ask and get composite totals?

A. Once you went to the right place you could get them, but the records are not assembled in an easy place of access. In other words, the Inspection Group has certain records, P&E has certain records, et cetera; to get a complete coherent story I found I had to go to several sources.

Q. It is not apparent as part of the managerial process that you have these presented at regular intervals for determining of your position or status with respect to the processes that we have discussed.

A. We have not, until now.

Questions by the President:

Q. Do I have it correctly, that of the total of 284 joints ultrasonically tested in SKIPJACK, 71 were rejected?

A. That is correct, sir.

Q. And that of those on which detailed information is available as to the reason for rejection, you have 141 joints, with records; and of those 141, 27 were rejects; is that correct?

A. I think that is correct, sir.

Q. And I believe you said that it would be no more than supposition on your part to say that the percentage of failures among the 141 on which you have records, was roughly the same as for the rest of the 284?

A. That is correct.

Q. In other words, your memory as to the nature of the failures does not present the feel whether those 27 were the best or the worst of the rejects?

A. No, sir, that is correct.

Neither counsel for the court nor the court wished to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly warned concerning his testimony and withdrew from the courtroom.

The court recessed at 1053 hours, 16 May 1963.

Unclassified

The court opened at 1113 hours, 16 May 1963.

All persons connected with the inquiry who were present when the court recessed were again present.

Frederick L. Downs, a former witness, was recalled as a witness for the court, was warned that his prior oath was still binding, and was examined as follows:

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Mr. Downs, when you testified before this court previously, you undertook to conduct additional tests and inspections of the various exhibits which were introduced before this court as debris possibly emanating from THRESHER; have you conducted additional tests?

A. I have, sir.

Q. Have you obtained any significant results therefrom?

A. None, sir. I was not able to produce the results for which I was looking.

Q. Was this true also of your collaborators, Mr. J. E. Carrigan and Mr. T. L. Sheehan, who worked with you on it?

A. Yes, it's true. Mr. Sheehan, of course, is the head of the laboratory.

#### EXAMINATION BY THE COURT

Questions by a member, CAPT HUSHING:

Q. Did you perform any tests on the heavy, oily substance which was adhering to the plastic bags in which the debris was wrapped?

A. We did, sir. This turned out to be a heavy oil of an ASTM class, which--I can't put my finger on the particular grade, but it was quite a common material, not restricted to Navy use only.

Neither the counsel for the court nor the court wished to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness made the following statement:

WITNESS: I have nothing, sir, except to explain one series of tests here which I indicated to the court that I would perform regarding the heavy yellow plastic sheet, borated polyethelene. We were trying to produce at that time a condition similar to the ragged tear shown on several of these pieces to determine, if we could, what condition might have caused this.

There was a test performed--we conducted tensile strength tests on samples which were necked down like the specimen; this did not produce an irregular tear; a tensile break showing yield and then a break, but it doesn't look like the other thing at all.

Then I performed an impact test in two directions to overcome the over-fringes effect to see if I could produce it that way, but it was nothing like the regular tears.

Then we were informed by an outside source, as a suggestion, that a similar sort of a tear might be produced by preheating the test material to about 150° Fahrenheit, and either blowing it up with air or forcing it through an orifice and when the final break occurred, it would create such a tear. We couldn't reproduce this; we tried but our samples didn't fracture, because of the thickness of the piece, at very high test pressures.

The witness was cautioned concerning his testimony and withdrew from the courtroom.

The court went into executive session at 1120 hours, 16 May 1963.

The court adjourned at 1830 hours, 16 May 1963.

THIRTIETH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Friday, 17 May 1963.

The court met in executive session at 0830.

Present: All members of the court.

The court recessed at 1230, 17 May 1963.

The court opened in executive session at 1330, 17 May 1963.

All members of the court were present.

The court adjourned at 1730, 17 May 1963.



**THIRTY-FIRST DAY**

**Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Saturday, 18 May 1963.**

**The court met in executive session at 0830.**

**Present: All members of the court and counsel for the court.**

**The court adjourned at 1230, 18 May 1963.**

**THIRTY-SECOND DAY**

**Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Monday, 20 May 1963**

**The court met in executive session at 0830.**

**Present: All the members of the court and counsel for the court.**

**The court recessed at 1300, 20 May 1963.**

**The court opened in executive session at 1355, 20 May 1963.**

**Present: All the members of the court and counsel for the court.**

**The court adjourned at 1813, 20 May 1963.**

Unclassified

THIRTY-THIRD DAY

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Tuesday, 21 May 1963

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court opened at 1037 hours and announced that this session would be held with closed doors.

All persons connected with the inquiry who were present when the court adjourned were again present in court, with the exception of (b) (6), who was relieved as reporter by (b) (6). RADM Palmer, a party, and his counsel waived their right to be present at this session of the court.

Vice Admiral William R. Smedberg, III, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry, advised of his rights under Article 31, Uniform Code of Military Justice, was duly sworn, and was examined as follows:

COUNSEL FOR THE COURT: Admiral Smedberg, this is a closed session of the court. Classified information can be divulged here.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. Would you state your name, grade, and present duty station.

A. I am Vice Admiral William R. Smedberg, III. I am the Chief of Naval Personnel, and also the Deputy Chief of Naval Operations for Personnel and Naval Reserve, stationed in the Pentagon and the Arlington Annex in Washington, D. C.

Q. Would you very briefly describe the nature and extent of your responsibilities for personnel matters in the Navy?

A. Yes. I am responsible for the procurement and recruitment and the education and promotion, and the retirement and separation - and I might also add the burial - of all officers and men of the Navy. I am responsible for the training of officers and men, except the aviators and medical officers. I am responsible for preparing legislation for the Congress for all matters pertaining to naval personnel. In other words, I am the head personnel man of the Navy and of the Naval Reserve.

Q. The court has received evidence that both the Commanding Officer and the Executive Officer of THRESHER were transferred at about the same time around the first of this year and within about ninety days of the conclusion of the post shakedown availability. Will you tell us what considerations dictated the transfer of both officers during an extended post shakedown availability?

A. Yes. The basic consideration was the pressure placed on the Bureau of Naval Personnel to furnish experienced commanding officers for the POLARIS submarines which are coming out, frankly, more rapidly than we can produce officers to man them. We barely are making our numbers today. We don't like to move commanding officers and executive officers during overhaul. However, we had to relieve Commander Axene because we had to have him as Prospective Commanding Officer of the JOHN C. CALHOUN SSB(N) 630. We had to move the Executive Officer of THRESHER because we needed him to replace a Commander Steele on a staff because Commander Steele had to commence his POLARIS training to be prospective Commanding Officer of another submarine. Steele was going to the DANIEL BOONE, SSB(N) 629.

Unclassified

Q. The Ship Superintendent for THRESHER was transferred from the Shipyard around Christmas of 1962, about the same time that the Commanding Officer and the Executive Officer were relieved. Realizing that the assignments of officers to specific ships within a shipyard is not within the purview of the Chief of Naval Personnel, I would like to know if the paucity of officers assigned to the Shipyard gave the Shipyard no choice in this matter?

A. That is a question that is hard for me to answer. I know that there was an exchange of correspondence between my Detail Officer and Lieutenant (junior grade) Cima, in which we told him that we planned to relieve him in about December of 1962, and he expressed his satisfaction with the orders, or with our plans, and he stated to us that he felt that his duties as Ship Superintendent for that ship would be completed about that time. I understand there was a slippage since then, and that slippage was not, frankly, brought to my personal attention, although I am sure that some of my officers knew of it. I don't know of any other comment that is pertinent, except that the replacement was an ex-enlisted man who had familiarity with submarines.

Q. Lieutenant Biederman, I believe his name was, sir - subsequently Lieutenant Commander Biederman.

A. Yes, I believe it was.

Q. Was any special request concerning personnel received during the period of the shipyard overhaul?

A. We had no requests that I know of from the Shipyard Commander. We did have a special request from the Commanding Officer of the THRESHER, Lieutenant Commander Harvey. I have a letter here from him - a copy of a letter from him.

Q. What is the general nature of it, sir?

A. It was a letter from him to Captain Newton, who is the head submarine detailer in the Bureau of Naval Personnel. He gives the status of the qualifications of all of the officers in the THRESHER, and he asked particularly that two of the officers, Lieutenant Commander DiNola and Lieutenant Smarz, remain in the ship during the post repair period of the submarine. We granted both those requests.

Q. Do you have that letter here, sir?

A. I do have a copy of that letter, and I am willing to introduce it.

Q. What is the date of it?

A. I have the letter from him and the answer from Captain Newton, which says, in effect, that Mike DiNola has passed his engineering examinations and he would make every effort to hold him in THRESHER "until after you go to sea again, and we don't anticipate moving Lieutenant Smarz until summer."

COUNSEL FOR THE COURT: Counsel offers in evidence the letter from Captain Harvey and the reply thereto from the Submarine Placement Officer in the Bureau of Naval Personnel.

The letter from the Commanding Officer, U.S.S. THRESHER, to the Bureau of Naval Personnel (undated), and the reply thereto were submitted to the court and were offered in evidence by counsel for the court.

There being no objection, they were so received and marked "Exhibit 222" and "Exhibit 223", respectively.

Unclassified

The court waived the reading of Exhibits 222 and 223.

Q. (By counsel for the court) Admiral, in extension of the question put to you as to considerations governing the transfer of both the Commanding Officer and Executive Officer of THRESHER during the post shakedown availability, I would like to ask one additional question: Were you satisfied that the officers sent to replace them in THRESHER were qualified in every way to relieve them?

A. Yes, I was. As a matter of fact, I had their records looked up originally and then I had them verified after the accident, to make sure we had not made a mistake and put inexperienced officers into the submarine. I felt that Harvey was one of the best qualified people we could find. He had been in NAUTILUS. He had been Engineering Officer of the TULLIBEE and Executive Officer of the SEA DRAGON. He had about eight years experience. Incidentally, I knew young Harvey when I was on duty at the Naval Academy. We knew him fairly well. We always admired him for the way he played football. He was a wonderful youngster. In the case of the Executive Officer, we felt he was qualified by his previous experience for this job. I might also say we left two additional Lieutenant Commanders in the boat, with extensive experience, to make sure their officers were well qualified.

Q. What considerations dictate the assignment of senior officers to nuclear submarines?

A. That is a hard question to answer, for this reason: The Manager of the Naval Reactor Branch has his considerations, which stem mostly from his safety responsibilities. We in the Bureau have rules which take into account the necessity for the Commanding Officer looking out for the safety of his ship, and also take into account his experience and his maturity and his demonstrated performance. We in the Bureau try to get the officers who have had experience in the conventional submarines and have proven themselves to be able executive officers and commanding officers in conventional submarines. We select those who have proper educational backgrounds, have demonstrated superior performance in submarines, and recommend them to the Manager of the Naval Reactor Branch for his interviewing. We don't think that the Manager of Naval Reactors has picked as many of those officers as we would like to see in the nuclear program because of their demonstrated experience as executive officers and commanding officers.

Now, I will admit there are two reasons I want to see these officers in the program: One is because they have already demonstrated that they are outstanding executive officers or commanding officers; and the other is that if they don't get into the nuclear program, they have no place to go in the years ahead in submarines. They are dedicated submariners. If they have no opportunity to advance in submarines, it is sort of a dead end for them, and it is very discouraging, I think, to officers in the conventional submarine service not to have the opportunity to go on.

I have made repeated representations to the Manager of the Naval Reactor Branch to get more senior qualified submarine officers into the nuclear program. A year ago I insisted that we needed about 117 senior officers in the Lieutenant Commander - Commander bracket from the conventional submarines to be trained in the nuclear program over the next three years. That was a year ago. This requirement was concurred in by the Submarine Force Commanders and the Chief of Naval Operations. It was not concurred in by the Manager, Naval Reactor Branch. We had a meeting with the Secretary of the Navy, who made the decision that 19 of these officers should be trained during the next three years. And, of course, that was a year ago. Fourteen have actually been introduced into the program in the Lieutenant Commander - Commander bracket. I think all 14 of them are Lieutenant Commanders, as a matter of fact.

Unclassified

At the time the Secretary made that decision a year ago, he stated that he would review the problem a year later. He is now in the process of considering the presentations that have been made by the Chief of Naval Operations and the Chief of Naval Personnel on this subject. We have now recommended that 100 senior officers, Lieutenant Commander or Commander, and 300 Lieutenants be placed into this program as soon as we can get them into the program. There has been no decision yet on that recommendation, which we feel is a requirement.

Q. When you refer to the Manager, Naval Reactor Branch, is that the same person as the head of Code 1500 in the Bureau of Ships?

A. That's correct. That is Admiral Rickover, who has the responsibility placed directly on him, by the law, for the reactor safety -- radioactive safety of these ships.

Q. But the decision as to how many officers should be nuclear-program trained is one for the Secretary of the Navy, is that correct?

A. Well, of course, the Secretary of the Navy makes all decisions affecting the Navy. Some of these decisions, he delegates to the Chief of Naval Operations, the Chief of Naval Personnel, and others.

Q. But this decision is one that was not delegated, is that correct, sir?

A. Strictly speaking, it is within my responsibility, but since we had a difference of opinion, the Secretary had to make the decision.

Q. What are the factors that limit the training of more submarine officers for nuclear submarine duty? You have told us there is some difficulty in getting a number which is satisfactory to you. What are the factors which govern the choice of officers?

A. Well, as far as the Bureau of Naval Personnel is concerned, I think I have outlined our requirement. First, we are in complete agreement with the Manager, Naval Reactors, that he must have an adequate educational background to absorb the nuclear training. Then I require that he have demonstrated outstanding performance. Those are the two major requirements. When my board in the Bureau of Naval Personnel selects an officer with those two requirements, we nominate him, for interview, to Admiral Rickover. I don't honestly know all the requirements that Admiral Rickover has. I know some of them. I have talked to him for long periods of time in this regard. One of the things he requires is an instant response, an officer with great mental alertness, and quite properly so. The methods by which he arrives at his conclusions are not entirely known to me. He has a very thorough system, I believe, whereby he is not the only one who interviews the young officers; they are interviewed by members of his staff before they come to him.

I feel that an officer who has demonstrated outstanding performance as executive officer or commanding officer of a submarine has demonstrated in most cases an alertness that we think is necessary in a submarine commanding officer or executive officer. But Admiral Rickover has a responsibility which I do not, and that is for the reactor safety problem, and he has a right to apply what he considers is necessary in that area. The fact remains, however, that in my opinion, an opinion which is shared by the Force and Fleet Commanders of the Atlantic Fleet and the Chief of Naval Operations, we do not have sufficient numbers of experienced executive officers and commanding officers in the program to insure that we are going to have a successful continuation of this program in the next several years.

Unclassified

Q. And a decision as to the numbers to be infused into the training program is pending now at the Secretarial level?

A. That is correct.

Q. Is there anything else you wish to add about the qualifications of officers who enter nuclear power training in addition to what you have told us, sir?

A. Well, I know that Admiral Rickover insists on an individual's being willing to devote his entire waking hours to his profession. We feel the same way about it, but I think he is more insistent that the officers spend longer periods of study than we are with the average naval officer. I don't say that he is wrong at all. Of course, the more a man studies, the better off he is, to a degree. A man cannot permit study to interfere with his operational requirements, or with his operational responsibilities. That is one thing where perhaps we have a little difference.

Q. Are non-nuclear qualified officers who are qualified in conventional submarines being ordered to nuclear-powered submarines?

A. Yes, they are. Not in the quantities that we would like, but in every POLARIS crew, for instance, there are about five non-nuclear qualified officers in the Navigation and Weapons Departments. Those officers are carefully picked. They are given extensive training courses. They hope, I think, most of them, that they will be able to get into the nuclear end of the game so that they will qualify for advancement, because if they can't, they know they have hit a dead end, really. They know that.

Q. Do our procedures permit them to aspire to transfer to the nuclear end of the business?

A. Yes, they do. If they are recommended, we nominate them for interview by Admiral Rickover.

Q. Admiral, from your position as the Chief of Naval Personnel, from the over-all Navy view, will you discuss the Navy's requirements for nuclear trained officers in billets afloat and ashore, and tell us whether the supply is equal to the demand now or in the foreseeable future?

A. The answer to your last question is no; the supply that I can foresee is not sufficient for the ship and shore and staff requirements in the nuclear power field. We have what we call "hard core" billets, which require nuclear trained officers in staffs and ashore. We call these "necessity" billets, where we think it is necessary to have qualified officers. We have 54 of these, and right now of that 54, 22 are in direct support of Admiral Rickover in his reactor units. We have about 13 or 14 -- in his schools, his and my schools, we have several qualified nuclear officers as instructors, but we can fill only about 34 of the other "hard core" nuclear billets on staffs and ashore. So we are short about 20 right now. There is no way I can see to fill these billets. There are others that are desirable also which we have not included here. For instance, I would like to have more officers qualified in this field in the Bureau of Naval Personnel. I have only one nuclear qualified officer in the Bureau to assist me now. We need more in OPNAV. We need them more in our training establishments, and frankly, as Chief of Naval Personnel, I want to have more opportunities for proper rotation to give a greater broadening to these officers and make a little better life for them and their families, because frankly, I can foresee the day when this constant command at sea is going to wear a commanding officer down to the point where he will not be willing or able to continue.

Q. You would like to see more of them in the command line all the way from CNO to staffs and individual ships?

A. That's right. I want to provide for better rotation than presently. It looks to me that the officers in about a fifteen-year period are going to have to serve in nuclear submarines almost continuously for many years. I now have 80 young officers in the program who have been selected for the post graduate school. I can't spare a single one to go to the post graduate school. They are being denied that opportunity right now.

Q. Testimony before this court has indicated a lack of input into the ranks of engineering duty officers, and also that their total numbers in the higher grades are steadily diminishing. In view of the complexity of modern submarines and the size of our present construction program, what steps are being taken to cope with this problem?

A. Well, we are taking a number of active steps. I should go back and say that in 1959 there was a board appointed by the Secretary to look into the AEDO duty and engineering duty specialists programs. That board recommended that the EDO community be reduced in size from about something over 1200 officers down to about 881. That was based on an estimate of the number of billets which require an engineering duty officer. They proposed that the other billets be filled by sub-specialists, unrestricted line officers with sub-specialties in engineering. I have delayed that reduction, because we frankly haven't been able to meet the sub-specialists concept. We have not been able to get the young officers into post-graduate training for several reasons, one being that we just can't get the money, but, more importantly, we can't get the volunteers for these harder technical courses from the officer corps today.

Now, some of the positive steps we are taking include permitting the Bureau of Ships to establish a board to screen what we call the "Burke students." Each year we select 10 outstanding Academy graduates or ROTC graduates who stand high in their classes and give evidence of career motivation. They are entered into a four-year package, with one year at sea and three years study leading to a Ph.D. The original idea of Admiral Burke was that these officers were to remain unrestricted line officers. In practical operation, we have discovered some of these officers have become so interested in their research work, they would like to become engineering duty officers. I have agreed that those who are so oriented and selected by the Bureau of Ships, may become EDO's. We also are cooperating with the Chief of the Bureau of Ships in letting him better inform officers of an EDO career and the opportunities associated with such a career. These are both Naval Academy and graduates of ROTC units.

We also have authorized a pre-selection for post graduates of 100 Naval Academy midshipmen first class, and 100 ROTC midshipmen for post graduate work. In other words, we tell them before they graduate, "You've been selected for further post graduate work provided your performance justifies it after leaving the Academy." These plans are designed to help strengthen the EDO community to increase the input at the bottom. As you know, all applicants for EDO are volunteers. We have had no quota limitations for the last two years on applications for transfer to EDO. In Fiscal 1961 we only had 45 applications. The board selected 28. In Fiscal '62 we had 62 applicants. The board selected 38. This year we have 69 applicants, and the board will meet later on this month to select them. We think the increase in the number of applicants is an encouraging trend. However, we still don't get enough applications from officers for the tougher technical post-graduate courses to fill our quotas. The reason for this is causing us a great deal of concern in the Bureau. I find, in talking to other college presidents, or to college presidents, that they are experiencing the same drop-off in applicants for the tougher technological courses.



Unclassified

I was asked recently when I was in Monterey as a member of the Secretary of the Navy's SABER board, which is an abbreviation for Scientific Educational Requirements for the Navy, or some such. I've forgotten how the abbreviation came about. I was asked a question by one of the civilian members of the board-- and I might say that the board is composed almost entirely of civilian educators and prominent business men. The only Navy officers on the board are the Superintendent of the Post Graduate School, the Superintendent of the Naval Academy, and the Chief of Naval Personnel. I am ex-officio a member of the board. I was asked by Mr. "Tex" Thornton, who is President of Lytton Industries, why we did not get more men into the Navy, because it was apparent to him that we needed more and more technically trained young men. I told him it was because of people like himself, and he looked puzzled and said, "What do you mean?" I said, "What do you start these young engineers out at?" He said, "Between \$560 and \$600 a month." I said, "That's your answer. The most we can offer them is \$270 a month."

Now, this is a very important factor, because the young men we want are smart. They are not stupid. They try to figure out a course for themselves throughout their lives, I think, to a greater degree than we did when we were young. The young man of today can see that if he goes into some kind of industry and uses his engineering degree, he can start off at around \$600 a month. That is the offer he is getting this year. If he goes into one of the Government agencies, he starts at \$550 a month. If he starts in Civil Service at the entering step, he starts at about \$460 a month. And we offer him \$270 a month in the service. That has got to be corrected, or we are not going to get the young people that we need.

Q. And do these problems exist at the higher grades?

A. I think even more at the higher grades. Our officers, when they get to be Captain or Commander, are now supervising civilian personnel, many of whom are drawing much more pay than they are, including the officers' pay and allowances. The officer is responsible for the production and the decisions rendered, but he is one of the lower paid people in his organization. This situation has got to be recognized to a greater degree than it is recognized today, and it is up to us senior officers to see that it is corrected.

Q. One question I would like to cover deals with the transfer of the Ship Superintendent from the Shipyard during the post shakedown availability. Is it possible that a little less rigidity could be infused into the transfer of limited duty officers at regular intervals of time?

A. Yes, it is possible, and as a matter of fact, this disaster has caused us to establish a new procedure in my Bureau which will improve liaison between the Shipyard Commanders and my Bureau. We will have an arrangement whereby Shipyard Commanders are encouraged to request extensions where necessary. We do try to have an orderly sea-shore rotation to provide people at sea the opportunity to come ashore without having to stay too long at sea, because today at sea the separations are getting longer and longer, and I think, as much as the lack of adequate compensation, the longer separations are causing people to leave the service. We are short about 4700 officers today in the United States Navy between the grades of Lieutenant and Captain.

#### EXAMINATION BY THE COURT

Questions by a court member, CAPT Hushing:

Q. Admiral, you have just mentioned, I believe, a new program to improve detailing procedures relative to limited duty officers. Does this include the warrant officer technical type?

Unclassified

A. It is not really a new program, but it will produce better liaison, which will result in a lessening of what was referred to as rigidity of detailing. As a matter of fact, what I would like to do is to advise officers about six months ahead of time about the plans we have for them in order to give them an opportunity to tell us what their situations are. The officer should tell his senior, for whom he works, what the planning is so that the senior could say, "We would like you to stay another six months or a year."

Q. I trust that you are not limiting this to Shipyard Commanders but to those that have similar problems?

A. Yes. Of course, you have to recognize that no officer in a position of responsibility likes to see his best officers leave him. One of the problems I have today - this is a little digression, but it is pertinent to the subject - one of the problems I have today is that of the fine, brilliant young officers in the guided missile ships, who are the very officers we would like to get into the POLARIS program. I am taken to task by Admiral Rickover because I do not persuade more of those officers to go into the nuclear program; but I have a responsibility for all the programs of the Navy, and I can't say to a Commanding Officer of a guided missile cruiser, "Your missile officer has got to go into the submarine program." He needs him in that program, and that is also a program that is in need of much help. We are short in that program; not quite as short as we are in the foreseeable future in the submarine program, but desperately short.

Questions by a court member, CAPT Osborn:

Q. Of the 117 officers on the commanding officer and executive officer level that you requested and the 300 lieutenants that you requested as an input in the program over the next three years--

A. I wish you would separate them.

Q. I want to talk about them as a group--

A. Well, let me say the 117 officers was last year's request, and the 300 lieutenants is this year's request. Last year we did not have a lieutenant problem brought up for decision; we were talking only to the 117 more senior officers. The number of senior officers required this year is 100.

Q. How many have we got available to choose that 100 from.

A. It is difficult to give you the number, very difficult, because I don't know what you would consider as available. I would consider the availables to be those officers whose Physics and Math and educational background would meet Admiral Rickover's standards, whose performance record would meet the Bureau of Naval Personnel's standards. I would say we had more than enough to be nominated for interview.

Q. How many of those people had previously been interviewed?

A. Some. How many, I can't tell you off-hand.

Q. Do you think it would be as high as 50 per cent?

A. I would only be guessing. It could be.

Q. How about the-- One other question: Are these people to come from Commanding Officers and Executive Officers of present submarines?

A. We feel-- and when I say "we" I am expressing the views of the Bureau of Naval Personnel, the Commander Submarine Force, Atlantic Fleet, and the Chief of Naval Operations - we feel that we must have from the conventional submarine force some experienced lieutenant commanders and/or commanders in order to properly provide commanding officers of nuclear submarines in the next several years. Now, after 1970, we don't have this problem. This is a particular problem that exists today because of the rapid expansion of the nuclear submarine program.

Unclassified

Q. How about the 300 lieutenants; what is available for selection in that group, and how many have been interviewed before?

A. Well, I can give you one specific example here. There are 97 lieutenants who, since interview by Admiral Rickover and rejection, have gone into post graduate study or have made significant advances, which we think rate them a second look by Admiral Rickover. We have proposed this, and he has agreed to take a look at some of them. How many, I don't know.

Q. He has taken a look at several officers a second time, hasn't he?

A. He has. I might say that in the submarine forces there are six or seven hundred lieutenants who desire screening. Of course, some of these would come out of the surface forces. As a matter of fact, I am even considering ordering into the nuclear program surface force lieutenants who don't volunteer for the program. I, of course, would not, however, ever agree to ordering into submarines officers who wouldn't volunteer for submarines, but after they completed the nuclear program, they could be available for surface ships.

Q. Now, in order to get the experience level in the supporting staffs in certain places, such as the Chief of Naval Operations, where they are needed, do you think you will cut down the length of tour?

A. We hope not to cut down the length of tour for commanding officers and executive officers.

Q. It looks like we are in a position that we can never get this problem settled until time settles it.

A. Frankly, we are in a position at the present time which will require that the present commanding officers will command several ships for a continuing period. We have already had one instance in which a Commanding Officer, after commanding nuclear submarines continuously for five years, has felt that he no longer is able to contribute what he should as a commanding officer to his job. We have recognized this, and we have ordered him out of the program. It is my feeling that this is going to show up more and more. Now, there are people, perhaps like yourself, Captain Osborn, who could go on commanding a submarine for ten, fifteen or twenty years without a break without its affecting them, but there are others that this sole responsibility without a break for extended periods does affect.

COURT MEMBER, CAPT OSBORN: There's lots of people, Admiral, that think I've been pretty well affected already.

Questions by a court member, RADM Daspit:

Q. Admiral Smedberg, you were asked about the assignment of non-nuclear officers to SSN's and, I presume, to SSBN's, and you remarked that they are assigned but not to the extent you would like. What would you like?

A. A young officer, to go from a conventional boat after he is qualified in submarines, into a nuclear boat or into the nuclear program and then into a nuclear boat, and to be able to have the feeling he could progress from a missile job or a navigator's job in the boat into the nuclear propulsion program, and then back into the general nuclear program. I recognize that all of the officers can't be accepted, because you do have to have more of an educational background. I recognize Admiral Rickover's complete right to throw out the officers whose backgrounds indicate they cannot absorb the course properly, and he has good solid ground for turning down an officer whose reactions are slow. I don't question that at all.

Unclassified

Q. But you have freedom now to put non-nuclear trained officers in both SSN's and SSBN's, except in the position of commanding officer and executive officer and the engineering department?

A. That is correct.

Q. In reviewing the situation on THRESHER, with the Executive Officer who was ordered away, Lieutenant Commander Cowhill, and the Commanding Officer, who was ordered away at about the same time, it would appear that there might be some merit, in view of Cowhill's experience in the ship, in fleeting him up instead of ordering a new skipper in there. Was any consideration given to that?

A. Yes, that consideration was given, but Cowhill had to be moved into a position for which his experience fitted him to relieve an officer who had to go to a Polaris boat command. In other words, in order to try to meet the Force Commander's requirements for the experience level, we had to go through this daisy chain.

Q. It looks like Harvey's experience might have satisfied him for that job just as well.

A. Well, our judgment was this was the best way to do it.

Q. Could you tell us about when Commander Axene and Lieutenant Commander Cowhill were advised that they would be relieved during the overhaul?

A. Let me see whether I have that. (The witness examined some papers in his possession.) On the 29th of May of last year, almost a year ago, we actually issued orders to Lieutenant Commander Harvey to report as Prospective Executive Officer of the ANDREW JACKSON, gold crew. Now, subsequent events, which stem from the over-all shortage of experienced nuclear trained officers, and Harvey's splendid over-all record in three nuclear submarines, caused us to replace him in the JACKSON crew by a more junior officer, and on the 30th of July of last year, I think it was, we ordered him to command the THRESHER to relieve Commander Axene. So I would think he had his orders a number of months before he actually reported.

(b) (6) relieved (b) (6) as reporter at this point.

Questions by the president, VADM Austin:

Q. Could you give us similar information regarding Commander Cowhill?

A. Well, I'd have to sort of go backwards, Admiral Austin, on that one, and say that we had to have a Commanding Officer to put into the Polaris Training Program to send to the DANIEL BOONE, and Commander Steele appeared to be the only one available. He was then on the Staff. We had to find an officer to relieve him and Lieutenant Commander Cowhill was picked because he'd had experience in three nuclear submarines and had the experience that the Deputy Commander Submarine Force wanted on his Staff. It was in about September, 1962, that we decided to order that "daisy chain" commenced.

Q. So it is reasonable to assume that he was informed of his prospective detachment from the THRESHER about September, 1962?

A. I think so, Admiral, but I don't have the exact figure on it. We can, however, furnish the court the exact date on which we notified him, either informally or by orders.

Unclassified

PRESIDENT: I don't believe that would be necessary because this gives us, I think, all that we need.

CAPT Osborn, a member: Admiral Smedberg, I think there is one very important point you might have had reason for detailing Commander Harvey to THRESHER, which is the advanced sound platform and because of his very advanced experience with TULLIBEE with almost the same sound installations.

WITNESS: Thank you very much.

Questions by the president, VADM Austin:

Q. Admiral Smedberg, there is a responsibility imposed upon the Manager of the Reactor Safety Program of the Navy by law which makes him responsible for the safety of the reactor. Does this also make him responsible for the safety of that ship?

A. The Commanding Officer is responsible for the safety of the whole ship, Admiral, as you well know. I would say that insofar as the reactor, the nuclear components, affected the safety of the ship, that is Admiral Rickover's responsibility. But in the case of the Commanding Officer to whom I referred a few minutes ago, who began to wonder whether he was still able to contribute all that he felt the Commanding Officer should contribute to his ship, it was directly my responsibility to see to it that the ship had a Commanding Officer in whom we had complete confidence that he could do his job for the safety of the ship and, frankly, I was worried and would have been worried if I had permitted him to continue. Now, he was scheduled to go on to command another ship, and he came to me because he felt that was not proper to himself or to his crew.

Q. The law, then, which imposes upon Admiral Rickover certain responsibilities regarding the safety of ships in which there are nuclear reactors does not relieve you, as the Chief of the Bureau of Personnel, of your responsibilities regarding the safety of ships from an over-all personnel viewpoint?

A. That's right; nor does it relieve the Commanding Officer in any degree.

Q. Admiral, has there been consideration of establishing a nuclear training program which will parallel that which Admiral Rickover is primarily concerned with?

A. Yes, Admiral, we have considered it, but frankly the costs are so prohibitive that we have had to drop it. Now you recognize, I think, that I have the responsibility for that training. Admiral Rickover is, by law, a technical adviser to the Chief of Naval Personnel in this training.

Q. But it would be deduced from the testimony before this court that there are criteria for the selection of people for instruction in this particular program which are established by only Admiral Rickover?

A. That's correct, Admiral.

Q. And that these criteria do result in limiting the number of people to a point that, as I believe you phrased it, "the successful continuation of the nuclear submarine program is in jeopardy."?

A. Yes, sir. We have to recognize, however, Admiral Austin, that as the technical adviser to the Chief of Naval Personnel, and as the man responsible for nuclear safety, Admiral Rickover is completely within his rights and responsibilities in turning down any officer that he doesn't think belongs in his program.

Unclassified

Q. The court is quite mindful of that, Admiral Smedberg, but the court is also mindful of the fact that THRESHER was lost as a ship; that the reactor compartment of the THRESHER is probably still quite safe and sound, but the ship is lost and the men in her have been lost. Therefore, there is a concern for the overall safety of ships which goes beyond the nuclear reactor program. In this case the commanding officer was one who was acceptable to you because of his fine performance but, as I see your problem now, there is approaching in the not distant future, a time when you are going to have qualms, perhaps, about the overall competence and experience at sea of personnel from whom you will have to choose Commanding Officers for your nuclear submarines.

A. Yes, sir. I have two comments on that. I believe that if every Executive Officer and Commanding Officer stayed in the program we would have no difficulty manning the boats with Commanding Officers and Executive Officers. I doubt whether we can keep them all in the program for the next seven years. Our studies have shown one other thing which I haven't mentioned; that during this critical period, until 1970, we are going to reach a point under the present selection system where the heads of departments of most of our nuclear submarines will have less than two years experience at sea. Now in order to obviate that certainty, we have to get three hundred more Lieutenants in the program very soon. This is a separate problem from the Commanding Officer - Executive Officer problem.

Q. Admiral, I would like to ask you a Navy question now. Before I ask you that question I will prepare the way by another. Did the Bureau of Personnel foresee the personnel problem that you have in manning the nuclear submarines today, ten years ago?

A. No, Admiral, we did not. Ten years ago; we had no -- I'm speaking, of course, in the abstract, because my connection with the Bureau of Naval Personnel started a little over three years ago.

Q. Yes, but you found at that time no evidence that seven years before you arrived they had begun to plan to train people for nuclear propulsion plant operations?

A. I'm certain, Admiral, that there was no thought of the quantity required; the numbers of officers that would be required today and in the next few years.

Q. Even seven years ago, when there was not a full appreciation of the magnitude of the personnel problems in nuclear submarines that we have today-- perhaps even five years ago the problem was not fully appreciated as it is appreciated today -- what then, would be the personnel situation if, as a result of a break-through in nuclear propulsion, the Congress ordered every ship of the U.S. Navy that was being built to be built as a nuclear propelled ship instead of one propelled by other means.

A. Well, I'm quite certain, Admiral, we would not be able to train the personnel under present conditions to meet such a program. Now I don't say that, given help, we couldn't meet the program, if we get adequate compensation which attracts people into the service and into that kind of work. If we offered salaries such as the reactor operator on the SAVANNAH got, over twelve hundred dollars a month, compared to the \$397 the same reactor operator gets on the LONG BEACH -- if we could meet that competition, we could attract the kind of brilliant youngsters into the service who could fill the need.

Q. But you could not meet the needs from the service as it is constituted today?

A. We could not.

Neither the counsel for the court, nor the court, desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly warned concerning his testimony and withdrew from the courtroom.

The court recessed at 1142, 21 May 1963.

The court opened at 1350, 21 May 1963.

All persons connected with the court who were present when the court recessed were again present. Also present was counsel for the party, RADM Palmer, RADM Palmer waived his right to be present at this session.

No witnesses not otherwise connected with the inquiry were present.

Captain Reuben F. Woodall, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry, advised of his rights under Article 31, Uniform Code of Military Justice, was duly sworn, and was examined as follows:

COUNSEL FOR THE COURT: Captain Woodall, this is a closed session of the court. Classified information may be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Would you state your name, grade, organization and present duty station?  
A. Reuben F. Woodall, Captain, U. S. Navy, Officer in Charge, U. S. Naval Submarine School New London, Groton, Connecticut.

Q. I direct your attention to Saturday, the 18th of May 1963, Acting under instructions from counsel for this court, did you obtain the affidavit of a witness?  
A. I did.

Q. Would you produce it, please?  
A. I produce the affidavit with enclosures.

Q. It bears the statement: "Subscribed before me this 18th day of May, 1963, in Washington, D. C." The signature under that is "Reuben Woodall". Do you recognize it as yours, sir?  
A. I do recognize it as mine.

Q. And the name of the affiant whose affidavit you took?  
A. H. G. Rickover, Vice Admiral, U. S. Navy.

Affidavit of VADM H. G. Rickover, U.S. Navy, taken in Washington, D. C., on 18 May 1963, with enclosures thereto, was submitted to the party and to the court and offered in evidence by counsel for the court. There being no objection, it was received in evidence as Exhibit 224. The reading thereof at this time was waived by the court and the party.

Unclassified

Neither counsel for the court, the court, nor the party desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Lieutenant Commander Keatinge Keays, U.S. Navy, a former witness for the court, was recalled as a witness for the court, reminded that the oath he had previously taken was still binding, and examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court. Classified information can be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. For ease of reference in the record, Lieutenant Commander Keays, would you state your name, grade, organization and present duty station?

A. My name is Keatinge Keays, Lieutenant Commander, United States Navy. My present organization is BUSHIPS, Code 525.

Q. In connection with your duties in the Bureau of Ships, do you have in your possession a document entitled: "Draft of Presentation on Effects of Shock on Machinery and Equipment in USS THRESHER", dated 25 March 1963?

A. I do, sir.

The above-described document was submitted to the party and to the court, and was offered in evidence by counsel for the court. There being no objection, it was received in evidence as Exhibit 225.

Q. What is the background under which the document, now Exhibit 225, was prepared?

A. During the THRESHER Shock Trials it came to the attention of several of those present that, by and large, many of the deficiencies that were showing up, not only on this shock trial, but in previous shock trials, could be traced to quality control, workmanship, in some cases good housekeeping in the case of forces afloat. It was also recognized that the results of the shock tests should be promulgated to the field. As a result of talking this over, it was decided by a number of us present that we should draft a presentation that should be given to the construction activities and, if requested, to forces afloat, giving the results of the shock tests; but also to take advantage of this opportunity to stress the workmanship and quality control angles of shock testing and their importance. About the latter part of February, the David Taylor Model Basin, Commander Beierl, called me and said he had such a presentation ready and would like to bring it over and try it on the Bureau of Ships to see if this met with the needs we'd expressed.



Unclassified

Question by the president, VADM Austin:

Q. What date was this?

A. Either the latter part of February or the first part of March.

Questions by counsel for the court.

Q. Proceed, please.

A. At that time the presentation was given to a number of representatives from the Technical Codes of the Bureau and the senior member present was Rear Admiral Moore.

Q. Of the Bureau of Ships?

A. Yes, sir. The decision was that the presentation was the type of thing we were looking for. It was stated at that meeting that there were some details technically that seemed not to be accurate and it should be reviewed for this purpose; and, in addition, we wanted to stress the quality control of shipyard work. In that connection, the David Taylor Model Basin withdrew at that point and said, "We will send you a formal draft of this presentation for your comments, and at that time we will formalize exactly what we want said and then we can go on with the presentation." This was the background of the presentation. It was forwarded to us on or about 25 March. We received it within a day of that.

Q. And the purpose of the document, then, was what?

A. The purpose was to form a background upon which we could not only promulgate the results of the shock tests, but take this opportunity to stress the quality control workman aspects. A great deal of emphasis had been placed upon the necessity to design for shock. There is not very much in the field to my knowledge, that stresses the quality control aspects, and this was the purpose of the document.

Q. What use does the Bureau of Ships contemplate making of this document?

A. We still have it under review. I have not received returns from all the Technical Codes. When these are returned we plan to go ahead with the quality control workmanship presentation and a parallel presentation which will be made around the same group of facts, but stressing what the operating forces can do to help make the ship shock hard. We plan to have another presentation that can be given at the same time at the same activity if the ships' crews indicate interest.

Q. Does the examination accorded to this document by the Bureau of Ships indicate that the document is subject to further revision?

A. Yes, sir. The preliminary comments I have from some of the Codes indicate that there will be revision in areas under their technical cognizance. They are, at the present, minor in nature. I can't say for certain that they will all be minor, but it looks at this time as if the revisions will be minor in nature.

Q. Why was THRESHER work singled out as an example of workmanship and quality control for the purpose of this study?

A. Only because she had the most recent experience in shock testing and would probably elicit the most interest on behalf of not only forces afloat, but the Shipyards. We could have built a similar document around any of the other submarines which we had previously shock tested.

Unclassified

Q. Referring to Exhibit 225, I will ask you to read the introduction?

A. "Introduction.

"Background. The incorporation of sufficient shock strength and reliability in vital equipment is a prerequisite to the safe and effective operation of ships and to the full exploitation of the potential capabilities of weapon systems. A program of shock trials is being conducted on operating submarines to improve the shock strength and reliability of equipment necessary for the operation and mission of the fleet. Underwater explosion shock tests have been conducted on five submarines: USS TROUT (SS566), USS SKATE (SSN578), USS BONEFISH (SS582), USS SKIPJACK (SSN585), and USS THRESHER (SSN593). This presentation summarizes the major results of the most recent and most severe tests, those on USS THRESHER, the first of a new class of attack submarines.

"Objectives. The tests on THRESHER had both immediate and long range goals. The immediate goals were: (1) evaluate the shock hardening measures based on the results of previous tests that were applied to equipment in THRESHER, (2) evaluate the shock performance of the novel noise reduction features incorporated in the ship, and (3) disclose and correct specific equipment weaknesses that were uncovered during the test.

"In order to provide a basis for improvements in THRESHER equipment during the post test shipyard availability, a report, "Note 1," was immediately prepared and issued." This report, note 1, was the preliminary report of the shock tests dated July, 1962.

COUNSEL FOR THE COURT: Which has already been introduced before this court as Exhibit 83,

WITNESS: "A more comprehensive test report has also been completed." And this second report also has a footnote and it was the final report.

Q. Do you know whether that report has been promulgated yet?

A. I do not, sir.

Q. Has it reached the Bureau of Ships?

A. I can't state for certain. I haven't seen it. I don't believe it has been published yet.

Q. It says, "To be published," does it not?

A. Yes, sir.

Q. All right. Continue.

A. "A primary long range goal was to secure quantitative data on which to base the development of more rational techniques for the design of efficient shock resistant equipment and more realistic shock specifications.

"The shock tests on THRESHER disclosed many deficiencies which were caused by poor workmanship, installation errors, inadequate inspections, deviations from plans, inadequate maintenance and use of unsuitable materials. These shortcomings seriously limited the combat capability and safety of the ship.

"The purpose of this presentation is to show how a modern submarine can be made more effective and safer under enemy attack. Examples of the actual occurrence of damage will be shown with high speed motion pictures and illustrated by numerous slides. Means are presented by which potential failures may be avoided." And that's

Unclassified

the end of the introduction.

COUNSEL FOR THE COURT: Let the record show that the motion picture referred in the reading has been showed to the court. All the members have viewed it.

Q. Would you now refer to page 25 of the exhibit and read the conclusions listed there?

A. "Conclusions.

"The tests showed, Figure 39, that THRESHER is more shock resistant than any submarine previously tested.

"a. THRESHER was able to maneuver after tests of greater shock severity than those which disabled previous nuclear submarines.

"b. Pretest shock hardening techniques greatly reduced the number and significance of equipment casualties.

"c. The large **b(1)** for major systems and machinery were undamaged, reduced the shock loads transmitted to equipment, and minimized damage at the THRESHER test levels.

"In general the improvement in reliability was due primarily to: a. Greater attention to shock requirements. b. **b(1)**  
c. Effective pretest shock hardening. d. Careful policing by ships force.

"The combat capability of a modern submarine is still limited by the shock sensitivity of vital equipment.

"Equipment in a modern submarine is considerably more susceptible to shock damage than is the hull or personnel. Effective combat capability is lost at a low shock test level.

"The tests point up the necessity for continuous attention to shock requirements in the installation, maintenance, and operation as well as in the design, fabrication, and testing of equipment.

"Almost all deficiencies were the result of the following: a. Poor workmanship; b. Installation errors; c. Inadequate inspection; d. Deviation from plans; e. The use of brittle materials; f. Inadequate mechanical design; g. Inadequate maintenance; h. The use of shock sensitive components for which shock-hardened items are now available." And that ends the "Conclusions", sir.

The court and the party waived further reading from Exhibit 225 at this time.

Q. Do you have in your possession a chronology of silver brazed joint and flexible hose problems generated through failures and water box problems which have been reported to the Bureau of Ships?

A. Yes, sir.

Q. Does it accurately reflect the records of the Bureau of Ships?

A. Yes, sir, it does.

Unclassified

The above-described document was submitted to the party and to the court, and was offered in evidence by counsel for the court. There being no objection, it was received in evidence as Exhibit 226. The court and the party waived the reading of Exhibit 226 at this time.

Neither counsel for the court, the court, nor the party desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Commander H. N. Larcombe, Jr., U.S. Navy, a former witness for the court, was recalled as a witness for the court, reminded that the oath he had previously taken was still binding, and examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, Commander Larcombe, and classified information can be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. For ease of reference in the record, would you again state your name, grade, organization and present duty station?

A. Commander H. N. Larcombe, Jr., USN, Commanding Officer, USS DOGFISH; and Commander Submarine Force Atlantic Admin, Portsmouth.

Unclassified

Q. Have you made a review of the various directives governing the initiation of a report leading to SUB/MISS at the request of counsel for this court?

A. Yes, sir, for search and rescue, yes.

Q. Will you first cite the directives which govern that operation, and then briefly summarize the directives for us?

A. The publications which apply to search and rescue which I believe we will find are applicable to the questions raised are: Commander in Chief, U.S. Atlantic Fleet Operation Order 1-62; Commander Submarine Force, United States Atlantic Fleet Op Plan 37-60; Commander Submarine Force, United States Atlantic Fleet Operation Order 1-61; Commander Submarine Flotilla TWO Operation Order 1-62; and there is general information covering search and rescue included in the National Search and Rescue Manual promulgated by the United States Coast Guard; USN Addendum to NWIP 37 ALPHA, Submarine Disaster, Search and Rescue Operations; and NWIP 23-6 ALPHA, Rescue of Submarine Personnel.

Q. Can you summarize them as they apply to THRESHIP?

A. Yes, sir. Commander in Chief, U.S. Atlantic Fleet, Operation Order 1-62, in the letter of promulgation, states: "This Operation Order is the basic Operation Order of the Commander in Chief, U.S. Atlantic Fleet. It is effective upon receipt." And Annex LIMA, which is the Search and Rescue Annex, the initial statement: "This Annex assigns or describes responsibilities for the conduct of search and rescue in the Atlantic Command; provides applicable instructions and information for those exercising SAR responsibilities . . ."

Q. By "SAR," you mean Search and Rescue, do you not?

A. Yes, sir, search and rescue responsibilities. On Page LIMA-6 in paragraph 4, areas of responsibility are defined: "Appendix 1 to this Annex delineates the boundaries of the various search and rescue areas within the Atlantic Command and indicates the command responsible for directing and coordinating search and rescue in each area."

There is a chart in this publication on which this information is given. The chart is not really satisfactory because you can't read it, so I brought the same chart from the CINCLANT FLEET INSTRUCTION, which allows you to read it, and in case the court wanted to have the information, I have drawn it on this chart by this red line showing the best information I have on the THRESHER's position, where she was and where she might have been going. Do you want this chart?

PRESIDENT: I don't believe we need that because we have that same chart in evidence, and if you'll just refer to coordinates --

WITNESS: Coordinates. I can give you the coordinates.

Questions by the president, VADM Austin:

Q. Just a statement as to whether or not the THRESHER's last known position was clearly within a well defined area spoken to in these various orders. This is all we need.

Unclassified

A. I'm not really sure what that posit is, Admiral. It is right on the boundary of the geographic line specified in the CINCLANT Fleet, Commander in Chief Atlantic Fleet Op Order.

Q. It is near the boundary line?

A. Yes, sir, at this area the longitudinal boundary is 65.00 West, and I believe the THRESHER's posit was either a little bit west or a little bit east of this line.

Q. Well, Commander, the important thing is if one knew one's position, and if one had this Instruction, should there be any doubt in one's mind as to which area one found oneself in and what to do?

A. No, sir, Admiral. I hadn't gotten to the section yet, but there is a paragraph in Commander in Chief Atlantic Fleet's Op Order 1-62 which discusses SUB/MISS/SUB/SUNK and establishes Commander Submarine Force Atlantic Fleet as being the appropriate one to take action although the command having responsibility for coordination is either Commander Eastern Sea Frontier if you were west of that line, or CINCLANT FLEET and the Coast Guard if you were east of that line. But the report --

Q. Those two are the same man in any event. It goes to the same command in any event?

A. Yes, sir, to ComSubLant.

Q. There, then, should be no doubt in the mind of one engaged in operations with a submarine in the area in question as to what to do if that submarine disappeared?

A. Not in my mind, Admiral.

Questions by counsel for the court:

Q. Turning to a new subject, Commander, can you briefly summarize for us the submarine rescue capabilities of the Navy as they existed at the time of THRESHER's loss?

A. Referring to the use of divers and the bell?

Q. Our capabilities in such areas, yes.

A. The bells, which are carried on all ASR's, have an operating depth of a manned capability of **b(1)** All of these bells are tested to **b(1)** unmanned. Once each overhaul cycle the bell has to be stream **b(1)** Divers have a capability with the equipment presently available and the training available, using helium-oxygen mixture, to operate at 460 feet for a period of twenty minutes. I understand that there is another process now being considered which could be used in an emergency only. This system has never been used before. It would allow operation of a diver at 600 feet for twenty minutes. And there is a Swiss gentleman who has worked at 750 feet and has test dived **b(1)**, but he won't tell us his secrets and he's lost two Americans doing it. As far as lift capability is concerned, I believe lifting a submarine by submarine pontoons is feasible to any depths, but getting the cable or the wire under the submarine, unless you're awful lucky, is going to require a diver; therefore, I would say this lift capability is limited to the maximum depth at which a diver can operate.

Neither counsel for the court, the court, nor the party desired to examine this witness further.

Unclassified

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Captain Samuel R. Heller, Jr., U.S. Navy, a former witness for the court, was recalled as a witness for the court, was reminded that the oath he had previously taken was still binding, and examined as follows:

## DIRECT EXAMINATION

Questions by counsel for the court:

Q. Captain Heller, for ease of reference in the record, will you again state your name, grade, organization and present duty station?

A. Samuel Reece Heller, Jr., Captain, USN, (b) (6). Present duty station is Portsmouth Naval Shipyard. My billet is Design Superintendent.

COUNSEL FOR THE COURT: This is a closed session of the court. Classified information may be divulged here.

Q. Captain Heller, have you presentations to make with respect to certain problems which have been postulated to you by the court?

A. Yes, sir, I have one study to report on, which was requested last week by the court. These are the fifteen copies required, and I would recommend that they be distributed for each court member. (Each court member was furnished a copy of the chart to which the witness thereafter referred.)

The assumptions here were that the ship was (b) (1) at the start of the problem, making eight knots, with the ship at neutral buoyancy and zero trim; that at time 9:11, which is the starting time of the problem, the order was given to make maximum power with the main coolant pumps in slow. A (b) (1) to obtain and then to control the angle as required. The casualty was assumed to start at time 9:11. At time 9:13.5 a thirty second blow of main ballast tanks was ordered. It was postulated that power would be lost when the trim angle reached thirty-five degrees. Collapse was required at 9:18.1 and, as before, the flooding discharge coefficient was assumed to be eight-tenths. The trajectory shown in the plot indicates that a six-inch hole would be required to match the time scale with the conditions imposed. Shown on the trajectory is the series of trim angles as the ship passed (b) (1) at the significant points in time.

The above described chart was submitted to the party and to the court, and was offered in evidence by counsel for the court. There being no objection, it was received in evidence as Exhibit 226-A.

(b) (6) relieved (b) (6) as reporter at this point.

Unclassified

Neither the counsel for the court, the court, nor counsel for RADM Palmer, party, desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness made the following statement:

WITNESS: I would like to take advantage of that for one moment, if I may, Admiral. The last time I testified, the question was raised by a member of the court concerning the draining of condensate from the air banks. I'd like to clarify that point at this time.

The inference was drawn, I believe, that this was a drydock operation, and I desire to make known that it is possible on all ships of this class, THRESHER included, to have drained the condensate inboard. There is a low point drain from the header that ties each of the air flasks together that penetrates the hull through a hull valve, and further inboard is a needle valve. These two valves can be opened in the proper sequence, with the needle valve being cracked, and blow any collected condensate inboard with the pressure in the banks.

PRESIDENT: This is operable from where?

WITNESS: From just inside the ship. This would mean for main air banks 2, 3 and 4, from the auxiliary machinery space; and for Number One, from the forward compartment.

PRESIDENT: And these locations are readily accessible?

WITNESS: Yes, sir. I can vouch for that from the recent series of blow tests on TINOSA where we have drained down following charging the banks prior to each of the several blow tests conducted.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Robert C. Peniston, Commander, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry, was advised of his rights under Article 31 of the Uniform Code of Military Justice, was duly sworn, and was examined as follows:

COUNSEL FOR THE COURT: Commander, this is a closed session of the court and classified information may be divulged here. At the conclusion of your testimony I shall ask you what classification you would accord to it as a whole.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, grade, organization and present duty station.

A. Robert C. Peniston, Commander, U. S. Navy, Naval War College, Newport, Rhode Island.



Unclassified

Q. How do you spell your last name, Commander?

A. P-E-N-I-S-T-O-N.

Q. Have you plotted information pertinent to the subject matter of this inquiry on a chart, at the direction of the court?

A. I have, sir.

Q. Would you produce it, please.

A. Yes, sir. (Hands document to counsel for the court)

Q. Commander Peniston, would you briefly outline, for the record, your naval background and training with particular reference to navigational matters?

A. I served as assistant navigator on the USS NEW JERSEY and as navigator of the USS WILLIAMSBURG.

Q. And your total length of service in the Navy, Commander Peniston?

A. Seventeen years.

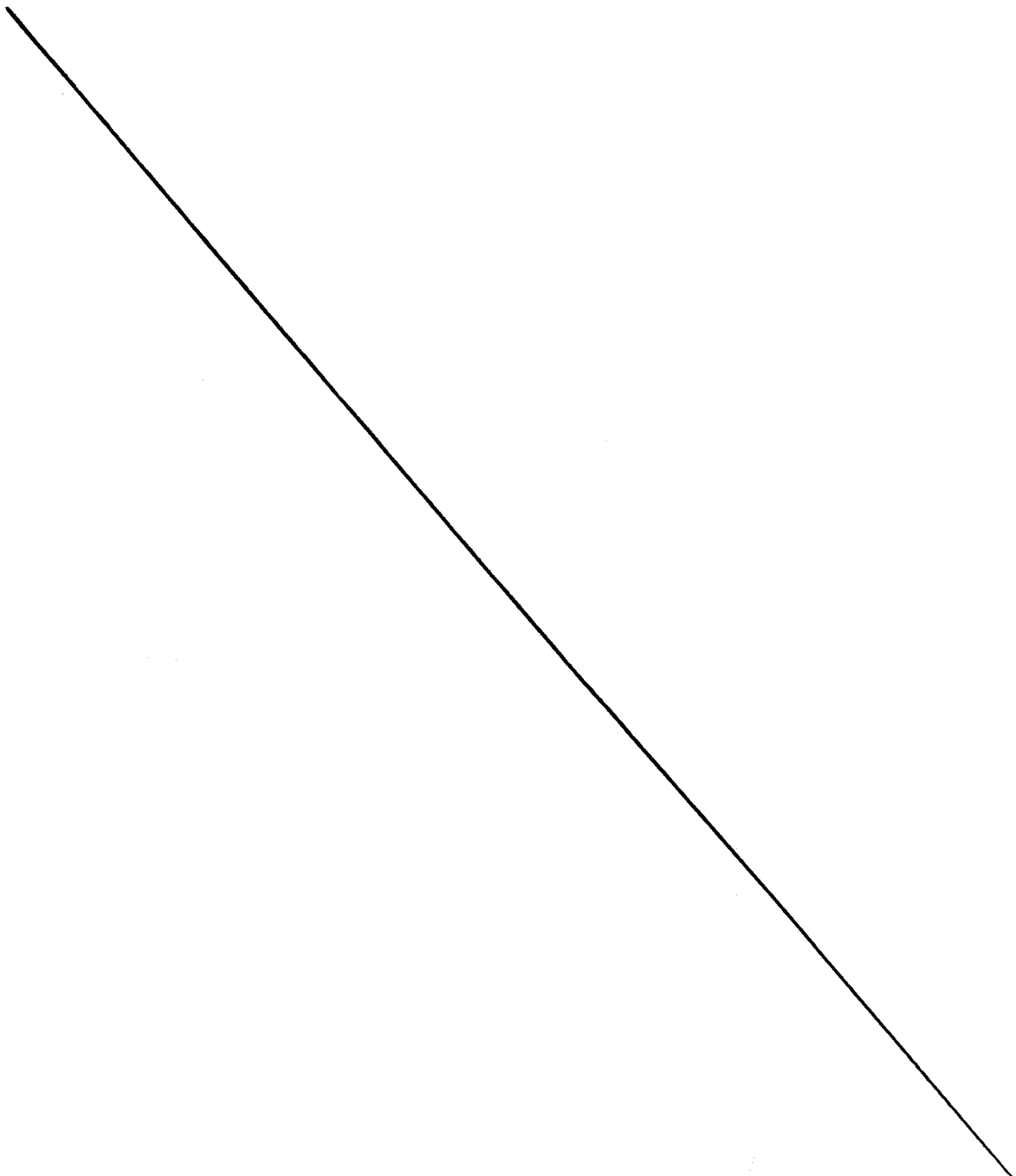
The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 227. The court and counsel for RADM Palmer, party, waived reading the document at this point.

Q. Commander, would you explain for the record, what you have plotted on this chart?

Unclassified

A. On this chart I have plotted the movement reports--or information from the movement reports--of USS THRESHER. I have also plotted, in red, the course and speed actually made good by USS THRESHER. On the chart is the point where the USS THRESHER submerged, and also the point where THRESHER was to meet SKYLARK the next morning of 10 April. I have plotted on here the last known position of USS THRESHER and SKYLARK's position at that time. I have also plotted the position of SKYLARK at her time of last contact with THRESHER. There is a position plotted here of the oil slick which was detected by SKYLARK. The search areas and the responsible commanders in those areas are also plotted.

An item of importance is the ellipse which was reported by the SOSUS system; the time the explosions were heard 0918.1 Romeo on 10 April. Within this ellipse the SOSUS system believed that explosions could have been heard, from this point, within this area.



Q. In your judgment, Commander, would it be correct to say that the sources of information from which you worked were the best information available to this court?

A. Yes, sir.

Neither counsel for the court, the court, nor counsel for RADM Palmer, party, desired to examine this witness further.

The President of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Charles R. Davis, Commander, U. S. Navy, was called as a witness for the court, was informed of the subject matter of the inquiry, was advised of his rights under Article 31, Uniform Code of Military Justice, was sworn, and examined as follows:

COUNSEL FOR THE COURT: Commander, this is a closed session of the court. Classified information can be divulged here.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, grade, organization and present duty station.

A. My name is Charles Russell Davis, Commander, United States Navy. My present duty station assignment is assistant counsel to this court.

Q. In connection with your official duties on this court, do you have possession of two classified messages regarding intelligence information germane to the issues before this court?

A. I do, sir. The first of these is a message from the District Intelligence Officer, First Naval District, addressed to COMNAVSHIPYD Portsmouth, passed to counsel of the court of inquiry. The message number is 150039 Zulu of May, 1963. (Hands document to counsel for the court)

The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 228. Reading of the exhibit was waived by the court and counsel for RADM Palmer, party, at this time.

Q. Would you identify the second message to which you have referred?

A. I have a second message from the District Intelligence Officer, First Naval District to Naval Shipyard, Portsmouth, passed to counsel of the court of inquiry. The message date time group is 152022 Zulu of 15 May 1963. (Hands document to counsel for the court)

The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 229. The reading of the document was waived by the court and counsel for RADM Palmer, party, at this time.

Q. Do you have in your possession official Navy Department messages which relate to the ~~determination~~ by the Secretary of the Navy of the death of personnel embarked in THRESHER?

A. I do, sir. The first of these messages is from Bureau of Naval Personnel to COMSUBDEVGROU P TWO, message date time group from BuPers 111523 Zulu of April 1963, relayed to NavShipYd Portsmouth with date time group 112010 Zulu of April 1963. (Hands document to counsel for the court)

The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 230. The reading of the exhibit was waived by the court and counsel for RADM Palmer, party, at this time.

Q. And the next message?

A. The next message, sir, is from Bureau of Naval Personnel to COMSUBDEVGROU P TWO date time group 121935 Zulu of April 1963. (Hands document to counsel for the court)

The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 231. The reading of the exhibit was waived at this time by the court and counsel for RADM Palmer, party, at this time.

Q. And the last message, Commander?

A. From BuPers to COMSUBDEV GROU P TWO. Date time group 120934 Zulu of April 1963. (Hands document to counsel for the court)

The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 232. The reading of the document was waived by the court and counsel for RADM Palmer, party, at this time.

Q. Do you have in your possession a report produced by the Portsmouth Naval Shipyard dated 1 March 1961, entitled: "Silver-Brazed Sea Water Systems in Submarines"?

A. I do, sir; the source of this report being from the official files of the Portsmouth Naval Shipyard. (Hands document to counsel for the court)

Q. Have you determined that no later reports or addenda exist?

A. Yes, sir, on the basis of a personal search and the questioning of cognizant personnel.

The cited document was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the document was received in evidence and marked as Exhibit 233. The court and counsel for RADM Palmer, party, waived the reading of the exhibit at this time.

Q. Commander Davis, have you taken two affidavits for introduction in evidence before this court?

A. Yes, sir, I have, in the course of my duties as assistant counsel to the Court of Inquiry.

Q. Would you state the background of your taking of these depositions, please?

A. On 7 May 1963, a Mr. Leo G. LeBlanc of (b) (6), contacted assistant counsel to the Court of Inquiry and advised him that he and a Mr. George M. Jackman of (b) (6), had important and pertinent information which they desired to bring to the attention of the Court of Inquiry investigating circumstances relating to the loss of USS THRESHER.

Mr. LeBlanc was invited to be present with Mr. Jackman for a preliminary interview at the Portsmouth Naval Shipyard at approximately 1830, 8 May 1963. This preliminary interview was conducted in the presence of Captain D. H. Kern, Captain R. F. Woodall, Commander C. R. Davis, and Lieutenant (jg) M. J. Gormley, III.

Q. All of these were naval officers?

A. Yes, sir. At that time, Mr. LeBlanc and Mr. Jackman were advised that their appearance before the Court of Inquiry would be arranged at a time convenient to them if they desired to appear voluntarily. Arrangement was made that they would be contacted by telephone on Saturday, May 11th, to set a firm time. During the course of the interview they requested the opportunity to appear before the court together. They were advised that under the procedure of this court it would be necessary that they appear separately as individual witnesses and that their testimony would, of necessity, be taken under oath.

On Saturday, 11 May, Lieutenant (jg) Gormley contacted Mr. LeBlanc by telephone and advised him that either Tuesday, May 14th at 1530, or Wednesday, May 15th at 1530, would be a time convenient to the court's schedule of witnesses, if it would be convenient to him and Mr. Jackman to appear. Mr. LeBlanc advised that 1530 on Wednesday would be convenient and requested that he and Mr. Jackman be scheduled to appear as witnesses.

On Tuesday, 14 May, Mr. LeBlanc was contacted by telephone since no telephone number had then been given for Mr. Jackman. The schedule of appearance for Mr. LeBlanc and Mr. Jackman, on Wednesday, was confirmed by Mr. LeBlanc.

On 15 May, shortly before noon, Mr. LeBlanc telephoned the Shipyard and left a message for assistant counsel that due to Mr. Jackman's illness and Mr. LeBlanc's personal commitments that they would not be able to appear as scheduled. The assistant counsel then telephoned Mr. LeBlanc and attempted to contact Mr. Jackman. This attempt was not successful and Mr. LeBlanc was again contacted seeking Mr. Jackman's whereabouts and telephone number. The number was given, and Mr. Jackman was then contacted by telephone and requested to appear as scheduled.

Mr. Jackman advised that his personal commitments were such that he could not appear, but arrangements were made for Mr. LeBlanc and Mr. Jackman to appear at the Portsmouth Naval Shipyard during the evening of 16 May to give affidavits. They appeared at about 1945. The proceedings which transpired

were in the presence of Captain R. F. Woodall, Commander C. R. Davis, and Lieutenant (jg) M. J. Gormley, III, as well as a court reporter. These proceedings resulted in affidavits.

Q. Would you produce them?

A. Yes, sir. (Hands document to counsel for the court)

Q. I note the initials, "G.J.," on the margin of each page of **this** affidavit. Whose are those?

A. Those are the initials of Mr. George M. Jackman, made by him in my presence, sir.

The affidavit of George M. Jackman was then offered in evidence by counsel for the court. There being no objection by the court or counsel for the party, RADM Palmer, the affidavit was received in evidence and marked as Exhibit 234. The court and counsel for RADM Palmer, party, waived the presence of the maker of the affidavit as a witness before the court.

Q. Referring to page 8, the final page of the affidavit, would you read the "witness clause" and the attestation thereafter?

A. "In witness whereof I have hereunto set my hand and seal this 16th day of May 1963, at Kittery, Maine. Signed George M. Jackman." This signature was made in my presence. The affirmation follows: "George M. Jackman, Jr., being duly sworn on his oath deposes and says before me on the 16th day of May 1963, that he is the person who subscribed his name to the foregoing affidavit, that the matters and facts set forth in said affidavit are true and that he executed the same as his own free act and deed, at 2335 hours. Signed (b) (6), Notary Public."

Q. Would you produce your second affidavit?

A. I have a second affidavit, given by Leo G. LeBlanc, dated May 16, 1963. (Hands document to counsel for the court)

Q. Was this affidavit also signed in your presence, by Leo G. LeBlanc?

A. It was, sir.

Q. And is it duly attested by a Notary Public under his seal?

A. It was, sir.

The cited document, Affidavit of Leo G. LeBlanc, was then offered in evidence by counsel for the court. There being no objection by the court or counsel for RADM Palmer, party, the affidavit was received in evidence and marked as Exhibit 235. The court and counsel for RADM Palmer waived the reading of the exhibit and the presence of the witness.

Q. One last question, Commander. Would you spell your name for the record?

A. D-A-V-I-S.

Neither counsel for the court, the court, nor counsel for RADM Palmer, party, desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness withdrew from the courtroom.

The court then recessed at 1507 hours, Tuesday, 21 May 1963.

The court opened at 1515 hours, Tuesday, 21 May 1963.

(b) (6), a civilian, was called as a witness for the court, was informed of the subject matter of the inquiry, was advised of his rights against self-incrimination, was sworn, and examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, (b) (6) Classified information can be divulged here. At the conclusion of your testimony I shall ask you what classification you would ascribe to it taken as a whole.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, address and present occupation.

A. (b) (6), (b) (6) My occupation is supervisor of the Hull Unit, Materials Development and Fabrication Branch of the Hull Division, Bureau of Ships. I am a graduate of the University of Southern Mississippi. I am a registered professional engineer metallurgist in the State of Mississippi. I have had other college work at Southern Methodist University, North Carolina State, and University of Michigan. I have had 20 years, approximately, experience in shipbuilding.

Q. How long have you performed your presently assigned duties at the Bureau of Ships?

A. Approximately a year and a half.

Q. What was your experience in the Bureau of Ships prior to that, sir?

A. I was superintendent of Quality Control and Chief Metallurgist for a shipbuilding contractor which did contract work with the Bureau of Ships, or for the Bureau of Ships.

Q. What shipbuilding contractor?

A. Ingalls Shipbuilding, Pascagoula, Mississippi.

Q. In connection with your present duties, have you conducted a personal investigation and inquiry into certain welding procedures and problems at this Shipyard at the direction of counsel for this court?

A. Yes, I have.

Q. (b) (6), I shall refer to a document before this court, which is Exhibit 234, and I will ask you questions concerning certain items in it. It will not be necessary for you to have the exhibit, if you will direct your attention to my questions and make your replies pertinent to the questions. With reference to the pressure hull of the THRESHER, approximately at Frames 54 to 55, the top center line welded seam between Frames 55 and 56--I am changing that--between Frames 55 and 56, there has been an allegation that there was a dense amount of porosity and slag inclusion in the seam of the pressure

hull running forward of Frame 55 for an approximate length of two feet and extending into and beyond the root opening for that distance. The allegation continues that the rest of the seam extending forward to approximately Frame 53½ would have indicated the same type of welding if exposed. Have you made a study of the radiographs for that portion of the hull welding encompassed in that statement?

A. I have.

Q. Would you tell us the results of your study and describe what it was that you based your study on?

A. The radiographic films were reviewed. The items cover the total films for all the longitudinal seams in this area. However, the radiographic group laid out--marked out--the area specifically so we could very carefully look at those that had been mentioned here in this seam at the top of the hull between Frames 53 and 56. There are some questionable--or a question could be raised--as to the quality of the films by virtue of the fact that no penetrometers were used on these films. However, judgment could be made by the ripples on the weld beads and surface discontinuity on the plates and other things to give a certain degree of confidence in reading the films. The films did not show evidence of gross porosity so if such did exist, it was apparently all background in the root preparation in preparing for welding.

Q. You mentioned there was no penetrometer used in connection with the radiographic plates. At the time of the building of THRESHER, was this condition, of lack of penetrometer use, prevalent in the radiographic techniques in the era 1958 to 1960?

A. No. They were used and required by the Bureau of Ships, Section S-91 of the specifications which were invoked via Mil Standard 271. And they were in evidence on the majority of the films that I viewed in sampling films taken on the THRESHER.

Q. Did you have a complete set of films available to you to conduct the review of the frames which you have mentioned?

A. No, sir. There were three films in the total set that were missing. One was an original film "E." The other two were missing repair films or films of repair areas of areas previously marked for repair.

Q. Were there enough radiographic plates for your inspection, to satisfy you that the seams were acceptable?

A. I couldn't speak for that area which is missing, of course, but for the balance of them, there was freedom from gross defect. This is always subject to variation in interpretation of radiographs between groups--different groups--reading them. However, it was based on the films themselves that we saw, and based on what we've seen, such as: slag in the PUFFS hydrophone well; the slag reported at Mare Island on the SCULPIN, and the SNOOK at the end of the horizontal frames across the hull--I believe at Bulkhead 28. Anything represented on these films was extremely minor compared to those, and these had not initiated cracks or shown a tendency to propagate cracks from the slag inclusions noted there, so at least we have this confidence level.



Q. My questions now relate to a different area of THRESHER. They relate to her pressure hull. In the auxiliary machinery space, approximately Frame 68, a butt had a root opening of approximately one and one-quarter inches. This root opening was made up with the use of backing strips and hand welding, and the gap was closed until a proper root opening of from three sixteenths to one-quarter inch was obtained. Did you make a study of this area of the ship's hull in an effort to determine the state of the welding?

A. I did.

Q. How did you do that and what were the results of your investigation?

A. Well this cannot be conclusively resolved from a review of the radiographs. The indications are that this is an error, however, in judgment. The finished weld surface was measured on each of the radiographs, of which there are 48, and the average finish weld bead varied - in unrepaired areas - from one and a quarter to one and three-quarters inches. The repaired areas widened the bead at the point where these had been made. An example of this is that the radiograph at location 42 was an original one of one and five-eighths inches, but in having to make repairs there, this surface bead had extended to two and a half inches. In another case at location 44, the weld bead was originally an inch and three-eighths and this extended to two and a half inches. This would indicate to me that the root opening and the plate weld edge preparation could not have varied more than a half-inch if this condition existed all the way out to the surface and it wasn't just a build up of the nose right at the point, and even then I can't conceive of it extending to the figures quoted.

Q. Based upon your examination, would you say whether the job was satisfactory?

A. From what could be observed from the radiographic film, yes, sir.

Q. I turn now to statements made about welding work on the 606 boat. A void space was located running from the center keel line to port six feet, and from the center keel line to starboard, six feet. This void space was located at the nose of the bevel of the frame at the bevel of the standing flange to the outer hull. Have you examined films relating to that area of the 606 boat?

A. No, sir, this would be a "T" joint which is not radiographed normally.

Q. Can you state that voids have been waived in the past?

A. Well, it is not the intent of the Bureau, of course, to have voids, because the requirement is for back-gouging of any poor penetration of weld. However, there have been occasions where voids have been waived on a case basis based upon the engineering consideration of the full parameters at the time, but only on a case basis when the full knowledge was known.

Q. Has there been a requirement that gouging for a hundred per cent elimination of such voids be accomplished in the past?

A. Well, I'll go back again to the basic specification which requires that the initial weld deposit be back-gouged to sound metal on all full-penetration welds prior to depositing the welding from the other side, except wherein by prior approval certain welding procedures are used such as twin-arc welding.

Q. (b) (6) , have I given you enough information really to pass a judgment on this particular welding?

A. No, sir.

Q. Would you say, from the little I have told you, it was an example of good workmanship or of poor workmanship?

A. I would have to say it is substandard, sir.

Q. Does it cause you any degree of alarm as to the safe construction of the hull in that spot?

A. It causes a degree of alarm but not to the extent if it were at another location. This is internal flooring, if I understood you correctly, which would be subject to compression loading on diving. Therefore, the surface of the weld bead would be enough to hold the flooring to the frame under bending.

Q. The next item relates to the same submarine, to frames 38 and 39. These internal frames in the crew's quarters had been prefabricated and sent to the building ways for assembly. The allegation was made that this was done without their being corrected for excessive tilt. When this condition was observed by the inspection department it was ordered corrected. The person, who cut these welds free from the hull by carbon arc, noted that there was approximately 30 to 40 feet on each frame to be cut from the hull from the upper half of the shell. These frames had been welded in a flat position in the prefabrication with airco-matic process. While cutting these frames from the hull, excessive porosity was encountered - allegedly - slag inclusion and void spaces were seen. In addition, cracks were encountered, both longitudinal on the frame and laterally across the frame welds. They were described as "too numerous to count." Have you had an opportunity to examine this area of the ship by records?

(b) (6) was relieved by (b) (6) as reporter at this point.

A. I have checked the records in an attempt to establish whether or not magnetic particle testing was done after the date alleged. The procedure was apparently this -- however, the records are sketchy at this time, and I was unable to tie it down perfectly.

Q. How would you summarize your findings with reference to this allegation?

A. It's hard to say that the Shipyard had not done all that they should. This was going to be re-welded. The frames were out of fairness, and whether or not they had postponed their inspection until after they had made an obvious correction, I could not say. Neither could I find evidence to substantiate this in the MT records.

Q. Referring now to another item on the same ship; Frames 45, 46, 47, in the crew's quarters, over the auxiliary tank, both port and starboard. Numerous cracks and poor welds were noted. These were repaired and re-repaired and showed essentially the same conditions as the last item which I mentioned to you. Did you examine the records to attempt to establish the factual basis for this?

A. It's the same thing; sketchy records make it impossible for this to be firmed up.

Q. Did you find any magnetic particle test records?

A. No, sir, not that I could tie down to that in particular.

Q. The next item, (b) (6) on the same ship, relates to the frame 33½ transition ring: In the preparation of this ring before assembly to the hull on the building ways, a machining error is alleged to have occurred. A machining error cut approximately two inches farther into the void space than the specification called for. To repair this error, a union melt process of welding was applied. This error was built up with the weld and re-machined and subsequently sent to the boat for assembly. In December 1960, this transition ring developed cracks too numerous to count. By this time the void space plates had been applied and had to come off again. In January 1960 this condition was believed to be still existent and was being repaired. Have you had an opportunity to examine the records of the ship as they relate to this item?

A. Yes, sir.

Q. What have you found?

A. I found that the mis-machining did occur, and that it was re-welded, not by the union melt process but by the Metal Inert Gas method of welding. Here is a photograph of the operation in process of building that up (the photograph was shown to the court). The sketchy records pose the same problem to confirm the inspection at the time this buildup was occurring. However, there is evidence, from discussing this with people on the record, that points out that wherein a bar was used down by the side to make the pocket into which the deposits was built up metal, that when they removed this they found defects along the edge of this bar. These defects were repaired. Since this is the first knowledge that we have received, and since this is not covered in the normal radiography, the Bureau has requested further tests to be performed in this area. These are in process, and this has not been resolved.

Q. There is another item relating to the same ship; that is, a statement that a member of a magnaflux crew inspecting repairs to the hull and its attachments stated at the time that he was not to bother with porosity and slag inclusions, but was merely to look for cracks. Would you comment on that?

A. I think this would be the proper instruction, since we only apply magnetic particle tests for surface inspection and not for sub-surface defects. It's very definitely limited in what it can do on sub-surfaces, the magnetic particle test.

Q. Another item on the same boat, (b) (6), relates to the after trim tanks. The fabrication, so far as welding goes, started about June of 1960 in Shop 92. The dual arc process of welding the root passes was used throughout. This welding connected structural frames to the tank top and side. The after trim tank subsequently went to the building ways to be assembled to the hull of the 606 boat, but upon inspection showed numerous cracks, slag inclusion, porosity and generally poor welding, to the extent that two to three months and a crew of six men, two shifts a day, were required to repair it. At the time the final assembly went to the boat, it was still unrepaired and needed considerable work. Have you had an opportunity to examine the records of the 606 boat with respect to this work?

A. We had the same problem here we had with the others, sketchy records in this period of time when the ship was building and MT, which was the inspection referred to.

Q. Were you able to come to any conclusion with regard to it?

A. Well, from statements made, I found indications that the yard was pursuing this and continuing inspection and continuing repair to clear it up.

Q. The next item relates to the same boat, (b) (6), and to the forward escape trunk. It is stated that the original welding of the sections of this escape trunk in the pressure hull indicated approximately thirty-six repairs, some of which exceeded two feet in length. Subsequent repair and re-X-ray indicated eighteen more repairs. There is no statement as to the conclusion of this work. Have you had an opportunity to examine the ship's records with respect to this item?

A. Radiographic records were examined with relation to this. The facts are, the records show 30 out of 180 films had questionable areas, of which 21 actually required repair welding to remove defects; the other 9 being resolved by surface grinding and inspection by Shop 26. Of the 21 repaired, 7 were re-repaired, 3 of these required further repair to clear.

Q. What is your conclusion, based on your examination?

A. The conclusion was that they did clear this up, and have records for doing it. Unfortunately the MT records are not available on this hatch due to the large number of repairs in question here. We have also requested the magnetic particle inspection of this access hatch.

Q. The last item concerning which I desire to question you relates to the 602 boat, the ABRAHAM LINCOLN, and to a record of X-ray repairs of Item 230, frames M45 to M46, repair "G", on February 1, 1960; Three A and B main ballast tanks. As to the tank top seam, and it is not remembered whether that was starboard or port, the allegation is made that the weld was repaired twelve times and X-rayed twelve times. Have you had an opportunity to examine the ship's records with reference to this weld?

A. Yes, I have.

Q. On what did you base your examination, and what are the results?

A. Well, I again attempted to check the MT records, which are sketchy at this time, and couldn't resolve anything definite from this. On the plot, the location denoted as "G" in the film, there is one, two, three, four repair films which are available, five and six; the original and five. However, unfortunately, there is no final film to show the final clearing of the defect.

Q. So much for specific questions regarding specific allegations, (b) (6) Now I should like to ask some questions about the Bureau of Ships directives in effect with respect to welding work in THRESHER at the time of her construction. Was there a requirement, at the time of THRESHER's construction, that every butt and seam weld in the pressure hull be examined by radiography and by magnetic particle inspection?

A. Yes, there was. S91 of the detail specifications required radiography of all butt welds in the pressure hull. Change Order 85 of 10 February '60 invoked MT inspections for these same areas. both after twenty-four hour waiting periods.

Q. (b) (6) , in referring to the records kept regarding THRESHER's butt and seam welding in her pressure hull, and that of other ships constructed at the Portsmouth Naval Shipyard, you've repeatedly used the phrase "the records were sketchy". Was there a requirement at the time of THRESHER's construction period that the radiographic records and the magnetic particle records be retained for a definite period of time?

A. On magnetic particle, there is none, to my knowledge. A radiographic requirement, S91K, requires submission of a complete set of radiographs accurately identified as part of the inspection records.

Q. Does it indicate how long those records should be retained by the shipyard?

A. No, sir. Now this was specifically covered by the Bureau's action 2367-3, invoked by Change Order in the latter part of the building of this ship, which required a definite period of three years for retention of the records.

Q. I shall ask the same questions now with respect to work performed on THRESHER during the period of her post shakedown availability. Was there a requirement that every butt and seam weld in her pressure hull be examined by radiographic methods and by magnetic particle inspection?

A. Yes, sir.

Q. Was there a requirement that the records of these examinations be retained for a definite period of time?

A. Yes, sir, by NAVSHIPS 250-627-3.

Q. Have you spot checked such records of work performed in THRESHER during her post shakedown availability for completeness?

A. I have, sir.

Q. What have you found?

A. I have found them complete, both radiographic and MT, as separate entities. The MT records could not be confirmed for three years - four years, due to the fact that they were handled by the Code 303N group and the person in charge of the records is on leave at this time. However, other people have told me that they have seen them and they are complete.

Q. (b) (6) , is there a requirement in effect, and was it in effect during THRESHER's post shakedown availability, that the radiograph records and the records of magnetic particle inspection be coordinated so that they could be cross-indexed and viewed as an entity?

A. Yes, by Section 5 of the Quality Assurance directive, which requires that both sets of records be kept in correlation in reporting to the Bureau on both magnetic particle and ultrasonic findings.

Q. Has this coordination of such records of THRESHER during her post shakedown availability been successfully carried out at this Shipyard?

A. Well, it's subject to question, by virtue of feedback of information from the MT inspection, which occurred after radiography, that Radiography ever knew whether or not any repairs were made at the requirement of the MT examination. This has now been plugged, and the present procedure is that the MT is fed back to the RT the same as the RT is fed to the MT.

Q. Referring to THRESHER's period of construction between 1958 to 1960, what directives were then in effect governing the issuance by the Bureau, or by the Shipyard, of waivers for welding which did not meet applicable standards?

A. Only those which have been mentioned are the applicable documents, such as Standard 248A, and the detail specifications.

Q. For that period are there any records in the Bureau of Ships that indicate whether or not specific waivers were requested by the Portsmouth Naval Shipyard in the case of THRESHER?

A. We have carefully checked the records from 1958 to 1961 at the BUSHIPS, Codes 525 and 634B for waivers to S91, the welding section, and we find none at the moment. However, Code 525 reports that trips were made to Portsmouth on specific cases on the hull of 593 during this period, but the trip reports and any other documentation of this apparently have already been sent to the Archives and are not available in the files.

Q. In November 1961, was a new directive issued applicable to boats of the 593 Class?

A. You are referring to NAVSHIPS 256-37-3 Change Order 176 of 8 November '61; and I believe that date is correct, I can check it accurately.

Q. It was effective approximately 8 November '61; is that correct?

A. Yes. Made applicable to the Change Order.

Q. During the post shakedown availability of THRESHER, do the records of the Bureau show that waivers were requested of the Bureau in the case of hull welding in THRESHER by the Portsmouth Naval Shipyard?

A. Yes, sir.

Q. On the 18th of January 1963 did the Bureau issue a speedletter covering waiver of the seven-day waiting period in the case of certain welding to be done on the THRESHER hull?

A. Yes.

Q. Do you have that letter?

A. Yes. (The witness produced it).

Q. This is a Bureau of Ships speedletter dated 18 January 1963 addressed to the Commanding Officer of the Portsmouth Naval Shipyard, subject: "Phone conversation, request waiver seven-day waiting period inspection of HY-80 repair welds." Is that correct?

A. Yes, it is.

The cited speedletter was offered in evidence and there being no objection it was so received as Exhibit (236). Reading of the exhibit was waived by the court and by the party.

Q. Was a letter addressed by Portsmouth Naval Shipyard to the Chief of the Bureau of Ships on 21 January 1963, subject: "Designation of authority for issuing of waivers, welding engineering?"

A. That is correct.

Q. Was that signed, "J. G. Guerry, by direction"?

A. That is correct.

A copy of the cited letter was offered in evidence and there being no objection it was so received as Exhibit (237). Reading of the exhibit was waived by the court and by the party.

Q. Was that 21 January letter answered by the BUSHIPS letter dated 25 February 1963, the subject of which was: "Definition of authority for the issuance of waivers, welding engineering?"

A. It was, sir. Might I qualify that these two might seem to be a lot of letters close together, one of which was issued before the speedletter. The speedletter originated from one Code and covered surveillance under their cognizance, while this covers the general welding under the cognizance of Code 634B.

The cited BUSHIPS letter dated 25 February 1963 was offered in evidence and there being no objection it was so received as Exhibit (238). Reading of the exhibit was waived by the court and by the party.

Q. Was there any further conference on this point, (b) (6) ?

A. There was.

Q. Would you please tell us of it?

A. A conference was held between all shipbuilding activities on 19 February 1963, at which they were all informed that any waiver of sequence of inspections, specified in Section 8 of Table 61 of NAVSHIPS 256-37-3 would only be granted upon Bureau approval. Complete documentation of extenuating circumstances which necessitated the waiver was required to be made and forwarded to the Bureau for record. This was made allowable by phone conversations if followed up with the record.

Q. Was the Bureau letter of 20 February 1963, Exhibit (238) before this court, withdrawn, cancelled or modified by further correspondence?

A. No, sir, it has not been to date. However, we have not received a report from Portsmouth Naval Shipyard of any incidents under this letter, as required in the last paragraph. Therefore, we assume they have not exercised the waiver privilege.

#### EXAMINATION BY THE COURT

Questions by the President:

Q. (b) (6) confining ourselves now to the THRESHER; was there anything in any of your investigations which revealed non-compliance with Bureau requirements or standards, or both, in the case of the welding on the THRESHER?

A. Well, I would obviously have to say, "Yes," with relation to the missing films and the lack of penetrometers showing on some of the films. I would like to say this: I think it could be truthfully said. Prior to joining the Bureau, I visited each one of the activities building submarines, and what I observed here in general in the welding at that time, and what I have observed on this investigation, doesn't indicate, of course, that Portsmouth was the leader of the field, but neither was it the worst in areas of welding observed.

Q. Was there any explanation given for the missing films?

A. Yes, sir, and the procedure indicates that this might be correct. They stated that they were shot but had been lost due to the fact that at this time the film shuffles to and from the shops for the investigation of surface discontinuities and irregularities. Someone might put a question on films, etc., and the radiographic crew said that all films at one time were present and these had been apparently lost in handling of the films.

Q. In your opinion, do the allegations to which we have been referring during your testimony, cause any doubt in your mind as to the safety of the hull of U. S. S. THRESHER?

A. As pointed out previously, and with relation to what we have seen in some of the slag inclusions, to give us confidence in these areas, I would say that there was nothing of that in what I observed and most of the allegations, as pointed out in testimony, were exaggerated.

Q. In other words, there was some substance to them, but in your opinion they were exaggerated?

A. Yes, sir, I believe this was brought out. The difference in the film and the different distances we have brought out. Technical findings could have been justified if we had other evidence to broaden the narrow bands to say this.

Neither the counsel for the court, the court nor the counsel for RADM Palmer, the party, desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Clarence Cole, a former witness, was recalled as a witness for the court, informed that his prior oath was still binding, and was examined as follows:

COUNSEL FOR THE COURT: Mr. Cole, this is a closed session of the court and classified information can be divulged here.

#### DIRECT EXAMINATION

Q. For convenience of reference in the record will you again state your name, address and present occupation?

A. Clarence Cole, (b) (6) ; Foreman Welder, Portsmouth Naval Shipyard, Shop 26.

Q. Mr. Cole, at the request of counsel for this court, have you investigated certain areas of welding, which were brought to your attention by counsel, having to do with various ships constructed at the Portsmouth Naval Shipyard?

A. Yes, sir, I have.

Q. I shall read to you statements concerning such areas of welding and then ask you what your investigation has uncovered with respect to them. The first one relates to the 606 boat. It states that while preparing frame No. 35 for

connection with a sanitary tank, a void space was located, running from the center keel line to port, six feet, and from the center keel line to starboard six feet. This void space was located at the nose of the bevel of the frame, at the bevel of the standing flange of the outer hull. This was brought to the attention of Mr. Clarence Cole, amongst others, by a man named George M. Jackman. He states that he had already received a letter from Captain J. B. Rich, Jr., in regard to this work. Do you recall the incident in which this weld job was called to your attention by Mr. Jackman, and can you tell us what the facts were, to the best of your knowledge?

A. Yes, sir. First, I have to say that this allegation is different than the first one that he made back some time in '60 or '61. In the first place, this frame does not connect to the sanitary tank; the sanitary tank is not at frame 35. In the second place, the standing flange in no case connects to the outer hull. This, to the best of my memory, was the web to the flange. These were fabricated frames, and this was a correction of flange tilt, as I remember it. These frames were fabricated on a ferris wheel type of setup, and welded with automatic ring process. Because of the flange tilt, one side of the weld had to be removed and the flange jacked back into shape and rewelded into the right location.

Q. If you recall, was Mr. Jackman in a position to find such a void?

A. He was in a position to find such a void, because he was real good with the arc air torch, and he was used to do this type of work in areas where we found weld deficiencies, and he was pretty much all over the ship. Wherever we found an area like this, we used him more for this work than for welding, because he was good at it, and he was directed to do this work by his supervisor.

Q. Can you state whether the condition which he described, as set forth in my question to you, was carefully discussed by the Welding Engineering Code, the Design Department and the Welding Shop at this Shipyard?

A. Yes, it was considered.

Q. What was the view expressed?

A. This is a slight void at the nose of the bevel that you do find at times in twin arc welding, and this was discussed by all three shops concerned, and they decided that a void in this area would have a minimum of effect on the strength of the joint.

Q. Do you fully concur in that?

A. Yes, I do. I say that we tried to do this without any void in there, but this does happen sometimes when you can't inspect the root.

Q. I now refer to a new and different item with reference to frames 38 and 39 of the same ship. These internal frames in the crew's quarters had been prefabricated and sent to the building ways for assembly without being corrected for tilt. When this condition was observed by the Inspection Department it was ordered corrected. Mr. Jackman states that his job was to carbon arc and cut these welds free from the hull. There was approximately thirty to forty feet on each frame to be cut from the hull, from the upper half of the shell. These frames had been welded in a flat position in the prefabrication with aircomatic process. While cutting these frames from the hull, he states, he encountered excessive porosity, slag inclusion and void spaces. In addition, he states that he encountered cracks, both longitudinal on the frame and laterally across the frame welds, too numerous to count. He further states that in his view the remainder of the frames contained the same condition; that to his knowledge this was never repaired or corrected. Have you looked into this matter?

A. Yes, sir, and I have a signed statement by Mr. Jackman that these things were completely corrected.



Q. Do you have that statement with you?

A. Yes, sir, I do.

Q. How is it that you happen to have that statement, Mr. Cole?

A. Because I knew it would come up. This is not the first time that this has happened. These allegations were made back in 1960 some time, the last of 1960.

Q. These allegations were made by whom, sir?

A. By Mr. Jackman and Mr. LeBlanc. This is signed by Mr. Jackman and Mr. LeBlanc, both of them, and this is a resume of a discussion with Mr. Jackman, Mr. LeBlanc and Mr. Cole.

Q. Whose signatures are these?

A. Those are their signatures.

Q. Do you know that to be a fact?

A. They signed them in front of me.

The cited resume of discussion between Mr. Jackman and Mr. Cole was offered in evidence and there being no objection it was so received as Exhibit (239). The court and counsel for RADM Palmer waived reading of the exhibit.

Q. Would you read the item on Exhibit (239) which relates to frames 38 and 39?

A. "Frame 38. This was completely repaired. Frame 39. Same as Frame 38".

Q. I turn now to a new and different allegation, Mr. Cole, relating to the same ship Frames 45, 46, 47 in the crew's quarters over the auxiliary tank, both port and starboard, upon inspection by Code 303, showed numerous cracks and poor welds. These were repaired and re-repaired, and showed essentially the same conditions warned of in frames 38 and 39". What do you know of the facts of that allegation?

A. What were those frame numbers?

Q. 45, 46, 47 in the crew's quarters over the auxiliary tank, both port and starboard.

A. I have a statement from Mr. Stevens, and he was a Code 303 inspector. It is a signed statement. Mr. Stevens said that frames 45, 46 and 48 had minor repairs to be made on them; frame 47 had an extensive area of incomplete penetration. These flaws were gouged out and completely repaired to the satisfaction of Shop 26 and 303. Mr. Stevens requested Shop 26 to notify him before welding these gouged out areas, so that they could be inspected, and this was done. Mr. Stevens says that he gets good cooperation from the supervision of Shop 26 and in no case does he know of an instance where a flaw has been welded over, and this is also a signed statement by Mr. Stevens.

Q. Mr. Cole, speaking of your own knowledge now, not Mr. Stevens', was that work performed to the satisfaction of Shop 26 and was it completely repaired in accordance with current standards?

A. It was completely repaired according to current standards, yes, sir.

Q. Now the next item relates to the 606 boat, and the allegation is made "While working in the 606 boat, I worked with two welders, who had apprentice ratings, on pressure hull butts. Their last names were Grenier and Reynolds. In this connection, Seavey, an apprentice welder, worked constantly on pressure hull butts with me on the 593 boat." Do you know about this item, Mr. Cole?

A. Yes, sir.

Q. Will you tell us what you know about it?

A. The statement is true; there's no question about it. They were completely qualified to do this work. Mr. Seavey was an apprentice welder who came into the Yard in 1955. He was qualified on July 13, 1956, to do HY-80 welding. This may seem like a short time to some people, but we take these apprentices into the Shipyard, and at this time we needed this type of work, so we trained them and qualified them to do the manual arc welding on HY-80, and not on everything else that they would get in their apprentice course; that would come later. Another name was Reynolds?

Q. It was; could you tell us his full name, please, and Mr. Grenier's first name. You are now referring to official record cards of your shop?

A. These are the official qualification record cards that are kept in the training school and are required to be kept on every man that comes into the Shipyard who takes the tests.

Q. Before leaving the discussion of Mr. Grenier's competence, would you refer to his official record card to give us his full name?

A. Joseph A. Grenier.

Q. Now you were going to tell us about Mr. Reynolds.

A. Bruce A. Reynolds. He was an apprentice welder. He came into the Shipyard in 1957. He was qualified on March 5, 1958, to do pressure hull welding, unlimited thickness, all positions.

Q. Did this include HY-80?

A. It did include HY-80. At this time we were not qualifying in HY-80. We were qualifying with a low hydrogen electrode and accepting this, after a certain statement here. All of these people were accepted after we built three ships here, and then the NAVSHIPS 256-36-23 came out and required a qualification on HY-80. This is x-ray and bend test. All of the welders that came in after that date were given a test according to that book. The other welders were accepted, who had built two or three ships. They were accepted as qualified, so he was therefore qualified to weld HY-80.

Q. Would you refer to your official records with respect to Mr. Seavey and summarize his status at the time mentioned in the allegation?

A. Mr. Seavey was completely qualified for unlimited thickness or position welding, on 7-13-56.

Q. What is his full name, please?

A. Richard W. Seavey.

Q. Did his full qualification, which you have described, include qualification to work on HY-80 steel also?

A. Yes, under the same conditions which I have repeated.

Q. Is there any more which you wish to say with respect to these men concerning whom I have questioned you?

A. I guess the only thing I can say is that I wish I had a lot more people that are ex-apprentices that can do as well as they can.

Q. Do you consider the quality of their work to be good?

A. Very good. Of course they are now graduated and are full fledged welders.

Q. Do you have any qualms or misgivings as to the work which they did on the pressure hull of THRESHER within your own knowledge?

A. Absolutely none.

Q. Now another item, Mr. Cole. This relates to the after trim tank on the 606 boat. "This fabrication was started, as far as welding goes, in about June of 1960, in Shop 92. The dual arc process of welding the root passes was used throughout. This welding connected structural frames to the tank top and side." On the first day of welding, Mr. Leo LeBlanc, George Jackman and Mr. Steve Regoulinsky, according to Mr. Jackman, were the only three qualified welders out of six working on the job. One limited welder's name was John "Franciosa," the spelling of which is given phonetically as "Franciosa." Also an apprentice welder's name was Langley. The other welder's name, according to Mr. Jackman, was not known to Mr. Jackman. Mr. Regoulinsky, Mr. LeBlanc and Mr. Jackman entered immediate objection to the type of fit encountered and the type of welding procedures, namely, dual arc used on these poor fits. According to Mr. Jackman, they predicted slag inclusion, cracks and generally poor welding as a result. They were told, according to him, by a Mr. Kelly that "A little slag here and there isn't important; it's the time we're going to save by this process that counts." According to Mr. Jackman, this after trim tank subsequently went to the building ways to be assembled to the hull of the 606 boat, but upon inspection showed numerous cracks, slag inclusions, porosity and generally poor welding to the extent that two to three months and a crew of six men, two shifts a day, were required to repair it. These men worked under a leadingman named George Fielding. The welders known by Mr. Jackman were John Murphy, Laurence Hackett and a certain Mr. Small. Mr. Small, according to Mr. Jackman, told Mr. Jackman on numerous occasions that by the time the final assembly went to the boat it was still unrepaired and needed considerable work. What do you know of the facts on which these allegations are based, Mr. Cole?

A. I'm familiar with it, because we have been through this before, twice to my knowledge, with Mr. Jackman. In the first place, Mr. Langley, Mr. Fransoso are both--he said not qualified--they are qualified. Fransoso was hired in as a Welder (limited).

Q. Would you identify them by name and state when they were qualified, please?

A. John J. Fransoso. Whether this is the correct pronunciation, I don't know.

Q. How do you spell it?

A. On his record card, it is F-R-A-N-S-O-S-O.

Q. Again you are referring to official record cards of the Portsmouth Naval Shipyard; are you not?

A. Yes, sir, qualification cards. He was qualified on 6-14-59, unlimited thickness, all positions, for hydrogen welding.

(b) (6) relieved (b) (6) as reporter at this point.

Q. Do you know the quality of his work?

A. Yes, he's a good welder.

Q. Another name mentioned is Langley. Can you tell us what the records show with reference to him?

A. This is Ralph O. Langley. He came in as a welder, limited. He passed his HY-80 test on--this is on overhead and flat position only, not on vertical--on 7-29-60.

Q. What do you remember about the job itself, Mr. Cole? There is an allegation in here that it took a long time.

A. I remember the job very well. This was a job that was started in Building 92. His statement is true, in that we did twin arc weld the frames and structures. We did not twin arc weld the boundaries of the tank. Some of the areas were not a good fit, and the people were instructed that in areas that were too tight, they were to have it opened up. The areas they were to open, they were to weld from one side, back gouge, and then weld from the other side.

Q. Was twin arc welding an accepted technique?

A. Yes, indeed.

Q. Was the tank successfully tested, to your knowledge, after the repairs?

A. Yes. Our Inspection Department did have a slip on this. One of the statements that was made in here is that we took so long to pass this tank. This was an area that was started in Building 92. There was a big workload at the time, and because of space requirements, this was moved into Building 178 when it was 10 per cent completed. This meant that it cooled down after being started. It was moved into Building 178 and nearly finished there. Again it was allowed to cool down, and it was put on the building ways and completed. Now, since that time, we have this 250-6373 Instruction on welding of HY-80, and this says that any time a weld of that type cools down, it must be completely inspected before we can weld it again. This was a growing-up period. We didn't have specific instructions out on this. This had a lot to do with the cracking and repairs. However, I think the length of time he gives is way out of line.

Q. It does not jibe with your own recollection of the events?

A. It does not, although I cannot prove what I'm saying, because I do not have that in the records.

Q. The next item is the torpedo ejection tube on the 606 boat. It is alleged that a section of this tube was welded with aircomatic process. Since stress relieving was impossible due to aircomatic welding, the weld was removed completely and rewelded by hand. Do you recall that incident?

A. Yes, I do.

Q. What are your comments with respect to that allegation?

A. Well, I think it is a boost rather than a knock. After we had welded this, this was in the time where with HY-80, everything was not known about it. We had directions from the Bureau that this wire that was used for MIG welding could not be stress-relieved. This was completely done, and we had to take this out because it had to be stress-relieved. We rewelded it. It was properly stress-relieved, tested and passed.

Q. The next item relates to the 580 boat, BARBEL. The work concerned the port ballast tank No. 7, rear bulkhead of BARBEL. He says, "This bulkhead was blown completely off the doubler plate and out of the weld, leaving the weld intact on both sides of the bulkhead and without tearing any steel from the bulkheads, indicating a complete lack of penetration of the weld metal to the bulkhead." He stated that his job consisted of carbon cutting the weld from the doubler plate to prepare for rewelding a new bulkhead, and that his leadingman at the time was Mr. Bob Smith. Are you familiar with this incident?

A. Although I did not see it, I am familiar with it, yes.

Q. Would you tell us the basis of your familiarity with it and state your knowledge of this incident?

A. This was looked into by the Design Department. This tank was over-pressurized. Something had to give. This was not a failure in the weld. The bulkhead did tear out of the weld. The Design Department looked into this and came up with the decision that this was not a weld deficiency.

Q. What caused the casualty?

A. Over-pressurization of the tank above the pressure required.

Q. Was that incident investigated in some detail?

A. Yes, by our Design Department.

Q. Mr. Cole, the last allegation concerning which I wish to question you relates to a quotation from a hearing transcript in the case of one Leo G. LeBlanc, welder, Check No. 26-05025. The transcript is dated 11 March 1963. It is a quotation from page 9 of the transcript, which I shall read to you:

"LeBlanc: Were you shown some inferior wire?"

"Flynn: Yes, you showed me a couple."

"LeBlanc: It was inferior, right?"

"Flynn: We are using it every day."

"LeBlanc: You're right; you are right; they are using it every day. Look at the repair work that is being done, but in your eyes that was not inferior wire, right?"

"Flynn: It wasn't."

"LeBlanc: When a coating of the end of the wire will break off approximately half an inch, create a bare wire and make the wire stick to the test plate, it's not an inferior wire, is it?"

"Flynn: No, I wouldn't say so. The wire is being used every day, Leo."

"LeBlanc: I can bring you ten welders up here and prove to you that the wire will do the same thing to them."

"Flynn: If it has passed approval and been accepted by the Welding Engineer, I don't have anything to say about it."

Q. Are you familiar with the wire about which they were talking?

A. Yes, I am. I sat in the hearing as a shop representative.

Q. Can you put this in the proper context for the court, please?

A. Yes, this man, Mr. LeBlanc, after being out for an extended period of time--

Q. Out in what way?

A. On unauthorized leave, excessive unauthorized leave. He had previously been out on six months leave of absence, and he came back, and we required him to take a test, because he had been away from it for more than three months. He had been out on unauthorized leave, and when he came back in from that, he was charged with this. Then he was down to the school taking the test. This was a vertical and overhead test on HY-80. He was instructed to weld his overhead plate in the overhead position, and he was accused of taking his plate down and welding it in the flat position, which did happen. He was only trying to make excuses as to why he was not passing the test and why he took it down in the flat position, and he tried to claim that the wire was no good; this was only an excuse by him.

I have a whole transcript of the hearing here, and this goes from page 9 to page 33 on this same vein, and on page 33 they called the Welding Engineer as a witness, because the shop had asked the Welding Engineer--well, I'm getting ahead of the story. Previous to this, he had been given a light test and he had taken the plate down and welded it in a flat position, but he was caught in the act, and was given a letter of reprimand. This time we had the Welding Engineer stand by. We called him as a witness, and the Welding Engineer suspected something like this, and when he kept passing him some rods, he complained that the coating was broken off, and the Welding Engineer had an apprentice and a welder trainee run the same kind of a test, and in the transcript this statement is made: that the electrode Mr. LeBlanc was using and the electrode the apprentice and trainee was using came out of the same bin, and the other boys had no trouble with it.

Q. Would you say that the electrodes used in the welding processes at the Portsmouth Naval Shipyard were faulty and not satisfactory for the purpose for which they were intended?

A. If someone wants to make this kind of allegation, every once in a while they can pick out an electrode that has a crack in the coating or the coating has come off and say, "Leo, this is a bad electrode." But the electrode we use in this Shipyard is a good electrode.

Q. What instructions do your welders have as to what to do when they find a bad electrode?

A. They are to notify the supervisor, and he in turn will notify the Welding Engineer, and he will look at it to see if it really does need looking into or whether it is just an isolated case.

Q. Mr. Cole, I detect from your testimony before this court that many of the allegations concerning which I have questioned you have been brought to your attention at some previous time. Is that true?

A. There's only one that hasn't been brought to my attention previously, and it was the one on the stress-relieving business.

Q. Is that the one which you interpreted as "a boost rather than a knock"?

A. Yes, sir.

Q. With reference to all of the allegations referred to, can you tell us whether those allegations have been thoroughly investigated by the appropriate personnel of this Shipyard?

A. Yes, and I have signed statements from all the supervisors concerned on all of the allegations, taken back in November, 1960.

#### EXAMINATION BY THE COURT

Questions by the president, VADM Austin:

Q. Mr. Cole, in Exhibit 239, dated 18 November 1960, and signed by Mr. LeBlanc and Mr. Jackman, there is indication that Mr. Jackman had the opinion that if he had continued gouging along the frame, he would have found more inferior welding, which would have consisted of mostly voids. The general order from the supervisors is to remove the crack and along a void space for a reasonable distance of about eight inches, and then weld it up. Is that a correct statement of the instructions?

A. This is a correct statement of the instructions.

Q. Is that a correct procedure?

A. This is a correct procedure, in that (b) (6) from the Bureau has been here and given us the same instruction in certain areas, yes, sir. Now, I might go back to this time and say that--I can't say whether the dates would be just exactly right or not, but at about that time our Design Department had written to the Bureau telling them that we were going to do twin arc welding and not complete back gouging in the internal frames unless otherwise instructed. In the interim time, before we got an answer from the Bureau, we did do this type of welding. This was after we had conducted tests here that would satisfy our Design Department that this was a good thought and a cheaper way to build an adequate boat.

Q. A cheaper way to build an adequate boat?

A. Yes, sir.

Q. Now I notice in paragraph 7 of this same exhibit, Mr. Cole, Mr. Jackman expresses the opinion that the major reasons for inferior quality of welding is because of the emphasis on quality to meet dates. Then he goes on to say in paragraph 8 that he has some recommendations, and I assume you are familiar with those?

A. Yes, sir.

Q. One is going back to the old policy of putting emphasis on quality instead of quantity, and (2) more emphasis on the proper preparation of joints before presenting to the weld proper root opening, proper spacers, correct bevels, proper root gouging, and on-the-job training for welders. Was Mr. Jackman justified in his feeling that more emphasis was being placed on quantity than on quality?

A. No, sir, he was not justified.

Q. Why do you feel Mr. Jackman got this "bee in his bonnet," then, about quality? Was he a good quality welder himself?

A. He was extra good in arc air gouging. That's why we kept him on that. I would say he was a good welder; not a top welder, but good. In my opinion, Mr. Jackman made these allegations because of the way he lives, I guess. He is a man that liked to be out in front, liked to talk loud, draw attention to himself, be a sea lawyer, I guess you would have to say. I really don't know any other reason for it. I can't figure it out.

Q. But in your honest opinion, there was no basis to criticize the quality of welding that was being repaired as a standard of performance at this Shipyard at that time?

A. No, sir. There is no question in my mind that it always can be improved, but I believe our standard was good. And when I said "good," I mean that it would meet all--well, we had flaws. We made mistakes. Being human, I guess we always will, but I would say our welding would compare with any other shipyard in the country.

Q. Did your welding at this time meet Bureau standards?

A. Yes, sir, it very definitely did. We would x-ray certain joints and find that we had places to repair, but they were repaired sufficiently to meet Bureau standards.

#### CROSS EXAMINATION

Questions by counsel for the party:

Q. Mr. Cole, you have given the court some information on what sort of a man Mr. Jackman was. Would you tell the court a little bit about your association with him? What I am interested in, in attempting to help the court, is your evaluation of what kind of a man Mr. Jackman was.

A. When Mr. Jackman first came to work in this Shipyard, as a man that you meet, he appeared to be a clean-cut fellow, somewhat intelligent, but for some reason or other, he likes to be out in front of the group, claiming that he knows a little bit more about everything than everybody else. Kind of likes to show the supervisors up if he can. The only terminology I can think of, he's a sea lawyer. He would like to take Mr. LeBlanc's case no matter what the case was, right or wrong. He would like to take his side and bring it to the supervisor and up to me and beyond me, if possible. It got to the point where Mr. LeBlanc was out a lot on leave, sometimes authorized, sometimes not authorized, and when he wanted to take a half day off, he would go to Jackman, and Jackman would go to the supervisor to see if he could do it for him.

Q. Did Mr. Jackman ever appear before you or in your presence, or to your knowledge, as a representative or as counsel at a grievance hearing?

A. Yes. This was right up his alley.

Q. Did this occur more than once?

A. Yes. Two or three times.

Q. Did he represent Mr. LeBlanc?

A. Yes, he did.

Q. Mr. Jackman terminated his employment by resignation from this Shipyard?

A. Yes, he did.

Q. Was this about the middle of 1961?

A. I would say about that.

Q. So far as your knowledge goes, was Mr. Jackman himself involved in disciplinary actions here?

A. Yes, he was, on two or three occasions. I know that one was--I think it was unauthorized absence, but I couldn't be sure. I know one was when he was caught asleep in his automobile during working hours.



Q. Would you tell the court something about Mr. LeBlanc? What kind of man was he?

A. Mr. LeBlanc is the type of man that was absolutely a nonconformist. He resents any type of supervision. Maybe I can explain it by reciting one incident: The Chief Quartermaster walked by him, and he saw him coming, and what would he do but take the hood down and weld while looking around over his shoulder to see what was going on, knowing it was wrong. This, of course, was not good practice. He was antagonistic toward any supervisor.

Q. Did he have any disciplinary problems while he worked at the Portsmouth Naval Shipyard?

A. Oh, yes. One was threatening bodily harm to a supervisor; another was using foul language to a supervisor; excessive unauthorized leave-- probably about four cases.

Q. And was the association between Mr. LeBlanc and Mr. Jackman a close one?

A. Yes, they were very close. In fact, wherever you see one, the other would be there, perhaps taking notes in a little black book.

Q. Now, Mr. LeBlanc no longer works at this Shipyard, does he?

A. No, sir.

Q. By what means was his employment terminated?

A. He was terminated by reason of excessive unauthorized leave. We had drawn two charges against him. One was failure to carry out his supervisor's orders. This was taking his test plate down on the overhead test plate and putting it in a flat position. We charged him with not carrying out his supervisor's orders. The other charge was excessive unauthorized leave. We combined the two. There was a technicality, and the charge of taking the test plate down was thrown out, in that we failed to list who told him to do this. They told us we didn't need it anyway, and it was thrown out.

Q. He was dismissed because of excessive unauthorized absence?

A. Yes, sir.

Q. This was just in April of this year?

A. Yes, sir, April of this year.

Neither the counsel for the court, the court, nor counsel for the party desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Albert Jackson, a civilian, was called as a witness for the court, was informed of the subject matter of the inquiry, was advised of his rights against self-incrimination, was duly sworn, and examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, Mr. Jackson. You can give classified information here.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. Will you state your name, address and present occupation?

A. My name is Albert Jackson, (b) (6)  
I am a leadingman welder.

Q. You are a leadingman welder at the Portsmouth Naval Shipyard?

A. Yes, sir, at the Portsmouth Naval Shipyard.

Q. How long have you been employed here?

A. I came to work in the Portsmouth establishment in 1948.

Q. When did you become a leadingman welder?

A. In September, 1956.

Q. Mr. Jackson, this court is looking into certain allegations concerning welding work done here at the Portsmouth Naval Shipyard made by Mr. George M. Jackman.

A. Yes, sir.

Q. I will read the first allegation to you and ask you what you know about it. This relates to the ballast tanks in THRESHER. The allegation states that Mr. Ted Mantos, welder, told Mr. Jackman that he had worked twelve hours a day approximately two months or better under the direction of Mr. William McCabe, with other welders, attempting to seal the ballast tanks for air tests prior to launching. He states this was about two months prior to launching. Do you know about the work done in the ballast tanks of THRESHER?

A. Yes, sir. I have first-hand knowledge of it, although I did not have the ballast tanks at that particular time. I had had them previous to this, but I was on the same boat in the same--well, I had the high-pressure structure internally, and I have talked to a few individuals that were concerned with that work, and primarily with Matt Hood, the Quarterman Chipper and Caulker, and the Leadingman Welder that worked that area at the time. This allegation of overtime, or the 12-hour day stretch in order to seal the tanks is not true. There was nobody worked any 12-hour day, day shift or not. However, we did have a very close schedule, mostly because the 602 and the 593 were being built simultaneously. We were second best as to sand blasting and painting and--

Q. In what way were you second best?

A. Well, in the use of the equipment. I wasn't clear enough on that. I should say we came second as far as the schedule was concerned, to get the use of the sand blasting equipment and the necessary time to get the painting ready for tests. We had a close schedule to work in sealing the tank, which included welding the flood holes, sealing all the penetration holes that hadn't been piped, and the closure plate on top of the tanks. This was done in a short period of time. The only overtime involved was the regular Saturday work. We did have some problems on final inspection of cracks involving HY-80, but it was all corrected, and we did in fact finally have a successful strength test on all the tanks. This is the test memo and the affidavit signed by the test people, Otis Smith and Mr. William Hardy. (The witness produced a test memorandum.)

Q. Does this show a successful test of the ballast tanks in question?  
A. Yes, sir.

The said Shipboard Test Memorandum was submitted to the court and to counsel for the party, and was offered in evidence by counsel for the court.

There being no objection, it was so received and marked "Exhibit 240."

The reading of Exhibit 240 was waived.

Q. (By counsel for the court) Mr. Jackson, did the work which you have described at one point as a job with "second" priority, proceed at such a rate that, in your judgment, it did result in second rate welding work?

A. No, sir. When I said "second best," that might require a little better explanation. We had a large work package to do in a short period of time. I do not think that it would have any bearing on the quality of work involved, and it was all--every bit of it--was inspected for satisfactory workmanship after we finished.

Q. My next question relates to the 606 boat, Mr. Jackson, and to frames 67, 69, 70, and 71. The allegation is made that these are external frames to the auxiliary machine space. It states, "These frames likewise had to be corrected on the building ways for tilt, and otherwise being below specifications as to height." Mr. Jackman alleged that his work on these frames consisted of teaching two men who had never had experience with the carbon cutting process to cut these frames from the hull and prepare them for rewelding. One of the students, whose rate he does not know, but to the best of his recollection was that of a Limited Welder, worked for about an hour cutting one of these frames, the number of which Mr. Jackman does not remember. The man stopped his work and asked, "Jack, what are all those holes in that welding?" The name of the man was John Gagnon. Mr. Jackman states that a witness to this incident was Mr. Leo LeBlanc, and that he told Mr. Gagnon at the time not to worry about all of the holes that he was going to run into. He further states, "It's commonly accepted; we run into it all the time. Just cut the frames from the hull." He goes on, "When Mr. Jackson, the leadingman, observed Mr. LeBlanc and myself discussing this situation and copying down the frame numbers, he told Mr. LeBlanc to mind his own business and to get back to his own job." Mr. Jackman says this was about October of 1960, and that the Leadingman Shipfitter on the job was Shattler. Do you know about this incident?

A. Yes, sir.

Q. Are you the "Mr. Jackson" referred to in that allegation?

A. I am.

Q. Would you tell us what you know of that incident, please?

A. We had approximately 100 feet of frame discrepancies to correct. Some of this footage was the web depth and some in frame tilt. The discrepancies were found by the Inspection Division, Code 303, and they gave us a list of the discrepancies that had to be corrected. I assigned two men to the job to make the necessary corrections and assigned Mr. Jackman to give these men better training on the air-arc process. It was during this time that he said he found these holes in the weld. The "holes" can't be described as holes as such because if they were holes in the welds, they would have been repaired, because we have the process of grinding them to the root of the hole, they are inspected, and rewelded. So I can only think that he is referring to porosity that was in the weld, of which there is

some porosity expected with the MIG process of welding, and that some porosity on a tee-connecting weld is within the acceptable standard. If this porosity was in the weld, not on the surface, the man removing the weld would be the only one that could see it. We don't have any way to tell whether there is any porosity in this type of weld other than a non-destructive test.

Q. Was it true then, and is it true now, that you would accept porosity in welds beyond the standards which apply?

A. Would you repeat that again, sir?

Q. Yes. I didn't say that clearly. Was it true then, that it was common practice to accept a degree of porosity in the welds greater than allowed by the applicable standards?

A. No, sir, not if it was beyond the standards. If it was beyond the standards and we knew it was there, we would correct it. If it was within the acceptable standards, then nothing would be done about it.

Q. Do you recall telling Mr. LeBlanc to mind his own business and get back to his own job?

A. Yes, sir, I do--many times.

Q. I have to ask you about another incident now, Mr. Jackson. It is alleged that about October 31, 1960, Mr. Jackman encountered Mr. Rene Noel, who was part of a magnaflux crew inspecting repairs to the hull and its attachments. Mr. Noel informed Mr. Jackman at the time that he was not to bother with porosity and slag inclusions. He was told that by his leading-man, and was told that he was merely to look for cracks. What comment would you make with regard to that allegation?

A. This is true. There was a group set up about, I would say, two years ago--perhaps two and a half years ago, and since has been disbanded. That was a group of welder helpers. They were used to supplement the Code 303 group on MT inspections. This MT inspection was on all welds to inspect for cracking. These men were not qualified to do anything but inspect for cracking, and at the time this particular man and the group of others were working in this area, I did order them not to inspect for anything other than cracks, and that a supervisor would do the inspecting for other weld deficiencies.

(b) (6) relieved (b) (6) as reporter at this point.

Q. Mr. Jackson, do you know of any welding work done in THRESHER in its pressure hull or elsewhere, which in your opinion was substandard, and which was allowed to remain so without being replaced or rewelded to conform with the actual specifications?

A. No, sir. I worked on THRESHER from the day the keel was laid until the day it was launched. I was not the only supervisor that was on the boat, but for quite a little while I was the only one; and that work on the THRESHER was just as good as was humanly possible to make it. We left no stone unturned to have a good sound ship; section butts, high pressure tanks, fittings, inserts, they were given a high degree of inspection, non-destructive tests. I don't know of any place on the boat that there was any substandard work allowed to remain as such. Every bit was repaired that was found, and there was a high degree of inspection on it.

Q. In a very few words, how would you summarize for us your estimate of Mr. George Jackman?

A. Mr. Jackman had the potential of being a good welder, a good asset to the Shipyard; but he got to be a "sea lawyer". He minded other people's affairs, helped them with grievances, imaginary and real, in some cases. Whenever anybody had business with the shop or with the supervisors and didn't feel as though they were able to handle it themselves, they'd go to Jackman. It got so that he was their spokesman - a very difficult man to keep on the job and get a day's work out of. If it hadn't been for that he would have been a good man.

Neither counsel for the court, the court, nor the party desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

Rudluff E. Chainey, (b) (6), was called as a witness for the court, was informed of the subject matter of the inquiry and of his rights against self-incrimination, was duly sworn, and was examined as follows:

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Mr. Chainey, would you state your name, address and present occupation?

A. My name is Rudluff E. Chainey. I live at (b) (6).  
. And I am employed as a Welding Engineering Technician.

Q. Are you employed at the Portsmouth Naval Shipyard?

A. Yes, sir.

Q. How do you spell your name, sir?

A. The whole name?

Q. Yes, please.

A. R-U-D-L-U-F-F C-H-A-I-N-E-Y.

Q. How long have you been employed at the Portsmouth Naval Shipyard, Mr. Chainey?

A. I'm in my 28th year, sir.

Q. And how long have you been a Supervisory Welding Engineer Technician?

A. Since last September.

Q. Mr. Chainey, I would like to question you about an allegation made by a Mr. George Jackman with reference to the construction of the SS(N)606 and ask you what you know of it. The allegation states with reference to Frame 33½, the transition ring, that in the preparation of this ring before assembly to the hull on the building ways, a machining error cut approximately two inches deeper into the void space than the specifications called for. To repair this error a union melt process of welding was applied. This error was built up with weld and remachined and subsequently sent to the boat for assembly. In December, 1960, this transition ring developed cracks too numerous to count. By this time the void space plates had been applied and had to come off again. When Mr. Jackman left the boat on January 20th, this condition was still existent, and was being repaired. Are you familiar with that occurrence, sir?

A. Yes, sir.

Q. Tell us what you know of it?

A. Number one: the submerged arc process was not used in the repair of this joint deficiency. The process that was used to correct this deficiency was the MIG process.

Q. MIG?

A. Yes, sir.

Q. Does that stand for Metallic Inert Gas?

A. It does, sir.

Q. Please go on?

A. Before work was started on this correction, we investigated the integrity of a weld of this nature. In other words, we made a sample of a similar, or a combination of these materials. In other words, we incorporated a build-up of MIG weld deposit completed with manual welding in the joint proper. The physical properties, mechanical properties, arrived at due to this were equal to the physical properties of what we expected of the base material.

Q. After the repair work was done, was it tested by magnetic particle inspection and passed?

A. Yes, sir.

Q. Did you have personal supervision of the test and technical supervision of the welding work done in the fabrication of this job?

A. I did, sir.

Q. What comment can you make with regard to the allegation that the transition ring developed cracks too numerous to count?

A. Well --

Q. Were there any cracks in the deposited metal?

A. I can't truthfully answer this. I question that there were cracks developed in the deposited weld metal. I think they were cracks that developed in the heat-affected zones of the base metal. To continue, in regard to the closing of plates over the void space, in this particular instance they were put on temporarily for the purpose of meeting schedules, with the understanding that they would be portable enough and be able to be removed to re-examine this spot at a later date; and this was done. I think that's it.

Q. Do you recall whether the cracks were gouged out and repaired?

A. Yes, sir.

Q. They were?

A. They were, yes, sir.

Q. Was the joint successfully X-Rayed? That is, was the joint X-Rayed and did it pass its X-Ray inspection, of your own knowledge?

A. No. This joint didn't lend itself to X-Ray. The only way we had of inspecting this joint was by magnetic particle inspection.

Q. And you have already testified that it passed that inspection?

A. Yes, it did. Right.

Q. Did you know Mr. George Jackman at all?

A. I did not, sir.

Questions by RADM Palmer, party:

Q. Mr. Chainey, was the area that developed cracks the area on which the MIG welding was deposited or some other area?

A. It was not on the MIG welded area.

Neither counsel for the court, the court, nor the party desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything related to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness made the following statement:

WITNESS: Well, gentlemen, I have only one thing to say and that is as long as I have been in the Shipyard and closely connected with the structure of submarines, I think this was probably the best one that I have ever been closely connected with.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

COUNSEL FOR RADM PALMER, PARTY: Mr. President, there are no further witnesses that counsel for the court wishes to call of which I have any present knowledge; therefore, I would like the record to show that the party does not desire to recall any witnesses. The party has no new witnesses to call, does not desire to argue, and recognizes that in the course of further proceedings of this court that there will be occasions when the counsel for the court or the court will desire to call or recall witnesses.

In that event, the party waives his right to be present, either personally or through counsel; and, in this connection, we would appreciate it, Mr. President, if we could have the help of counsel for the court should any matter affecting Admiral Palmer be received, in which you feel that we might have a direct interest.

PRESIDENT: That is testimony?

COUNSEL FOR RADM PALMER, PARTY: Yes, sir. May we have that privilege?

PRESIDENT: This court is happy to accord that privilege.

COUNSEL FOR THE COURT: Are the statements of counsel made with the knowledge and express consent of the party, Rear Admiral Palmer?

COUNSEL FOR RADM PALMER, PARTY: They are made with the knowledge and express consent of Admiral Palmer.

The court recessed at 1725, 21 May 1963.

The court met in executive session at 1740, 21 May 1963.

Present: All members of the court and counsel for the court.

The court adjourned at 1835, 21 May 1963.



THIRTY-FOURTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Wednesday, 22 May 1963.

The court met at 0830 in executive session.

Present: All members of the court and counsel for the court.

The court recessed at 1245, 22 May 1963.

The court opened at 1345, 22 May 1963. All persons who were present when the court recessed were again present.

The court adjourned at 1800, 22 May 1963.

THIRTY-FIFTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Thursday, 23 May 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1230, 23 May 1963.

The court opened at 1335, 23 May 1963. All persons connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1800, 23 May 1963.

THIRTY-SIXTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Friday, 24 May 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1230, 24 May 1963.

The court opened at 1325, 24 May 1963. All persons connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1630, 24 May 1963.

THIRTY-SEVENTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Monday, 27 May 1963.

The court met in executive session at 1005.

Present: All members of the court and the counsel for the court.

The court recessed for lunch at 1255, 27 May 1963.

The court opened at 1405, 27 May 1963. All persons connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1850, 27 May 1963.

THIRTY-EIGHTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Tuesday, 28 May 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1300, 28 May 1963.

The court opened at 1400, 28 May 1963. All persons connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1835, 28 May 1963.

THIRTY-NINTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Wednesday, 29 May 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1315, 29 May 1963.

The court opened at 1405, 29 May 1963. All parties connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1905, 29 May 1963.

FORTIETH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Thursday, 30 May 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1305, 30 May 1963.

The court opened at 1415, 30 May 1963. All parties connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1805, 30 May 1963.

FORTY-FIRST DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
Friday, 31 May 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1300, 31 May 1963.

The court opened at 1405, 31 May 1963. All parties connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1840 hours, 31 May 1963.



FORTY-SECOND DAY

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Saturday, 1 June 1963

The court met in executive session at 0830.

Present: All members of the court and counsel for the court.

The court then met with open doors at 1205 hours, 1 June 1963.

Present: All members of the court, counsel for the court, and (b) (6) as reporter. RADM Palmer, party, and his counsel expressly waived their right to be present at this session.

J. Lamar Worzel, a civilian, was called as a witness for the court, was informed of the subject matter of the inquiry and of his rights against self-incrimination, was duly sworn, and was examined as follows:

The witness was duly cautioned with regard to classified information.

DIRECT EXAMINATION

Questions by counsel for the court:

Q. State your name, address and present occupation.

A. I am John Lamar Worzel. My address is (b) (6)  
(b) (6). My occupation--I am a Professor at Columbia University, Assistant Director of the Lamont Geological Observatory, and at present chief scientist on the ROBERT D. CONRAD.

Q. What is your professional and educational background and experience, Doctor?

A. I have a Bachelor's Degree from Lehigh University in 1940, a Master's Degree from Columbia University in 1949 and a PhD from Columbia University in 1950. I have spent 25 years--perhaps a little bit more--working at sea in research work, specifically in underwater sound research, in seismic refraction measurements and underwater photography. I guess that pretty well covers the question.

Q. Do you have any specific experience in the design and construction of submarines?

A. No, not in the design and construction.

Q. What is your connection with the search for THRESHER?

A. We offered our services to the Navy through the Office of Naval Research, if it was desired, if the tools of our trade would be of any use in the search for the THRESHER. We have been trying to provide advice as to how we think it might be detected.

Q. You have been embarked in CONRAD during her recent search efforts, is that correct?

A. Yes, sir. I have been chief scientist on board since she has been in the area.

Q. When did you arrive ashore from your most recent search?

A. Late last night.

Q. Do you have photographs recently obtained by CONRAD of the ocean floor in the area of her search for THRESHER?

A. Yes, sir.

Q. Would you produce them please.

A. Here are some of them. (Hands documents to counsel for the court)

Q. Can you tell us when and how they were taken?

A. These were taken by an underwater camera which is suspended by a wire over the side in the 1350 fathoms more or less of the area. Our mode of operation was to move as slowly as possible in the face of the currents--which are very bad out there--and to photograph at frequent intervals with the ultimate objective of uncovering any evidence that might lead us to THRESHER. This is one of the techniques. We have had many others, and our particular camera is triggered by a weight striking the bottom and we can photograph once a minute. It takes one minute for the film to wind and the strobe light to be reactivated.

Q. Can you give us any idea of the location at which the photographs were taken?

A. I have here a small chart of the area in the vicinity of the position which we know as DELTA, and these tracks are where we have taken about approximately 1500 photographs in this search.

Q. The position you know as DELTA has been referred to previously as DATUM has it not?

A. No, Datum is the center. DELTA is one of the spots that Woods Hole had investigated with the thinking that they had a contact that would indicate possibly a submarine.

Q. What is the approximate location of DELTA from the position given previously as DATUM?

A. It is about three miles to the east and about three-quarters of a mile south of DATUM.

Q. Can you tell us the approximate height above bottom of the camera at the time the pictures were taken and the size of the field which it can record?

A. The camera was 20 feet off the bottom when the pictures were taken and takes an area about 20 by 20 feet.

Q. Do the photographs which you have produced give all of the pertinent photographic information available to CONRAD?

A. Yes, sir.

Q. Can you tell us about what time they were taken?

A. They were taken at 1400 on Wednesday--no, Thursday afternoon.

Q. Thursday afternoon. That was the 30th of May, 1963?

A. Yes. The three smaller ones on top show where some large heavy object has moved along the bottom making tracks. We have done some dredging in the area but our dredges could not possibly make tracks as deep or as wide as those, so we had presumed that these were indications perhaps where the THRESHER skidded on bottom when she made bottom contact.

Counsel for the court then offered the cited photographs, five in number, in evidence. There being no objection by the court, the photographs were received in evidence and marked as Exhibits 241, 242, 243, 244 and 245 respectively.

Q. With regard to the exhibits entered before this court as Exhibits 241, 242, and 243, can you determine the direction of the tracks recorded thereon?

A. I can't from the photographs, but I can from the tracks. We photographed these on several of the different passes of the camera and from these they have an azimuth of about 190.

Q. Now adding to those the two other photographs, Exhibits 244 and 245, can you state whether any of the five photographs now laid before you are part of the THRESHER?

A. No, I can't make that statement.

Q. I refer you to Exhibit 245, the circular photograph. Have you been able to determine what it portrays?

A. Yes, sir. Apparently the trigger weight that we used in this camera got lodged in the framework of the camera, and this is that trigger weight.

Q. Are you referring to the small object in one segment of the circle?

A. In one segment of the circle, yes, sir.

Q. And the black line protruding almost to the center of the circle is what?

A. Our trigger line. Normally the weight hangs beneath the camera. We formerly thought, before we came in, that this was our camera line over a piece of perhaps the THRESHER, a piece of the wreck, but yesterday afternoon as we were coming in, it occurred to us that this might be a photograph of our camera weight. We made tests and established that it was indeed our camera weight.

Q. You have made tests and established that it was part of the camera shutter mechanism?

A. Not the shutter mechanism, no.

Q. But part of the camera mechanism?

A. Part of the camera mechanism, that is right.

Q. With reference to Exhibit 244, what can you tell us about the object portrayed on that?--Can you tell us its dimensions and any other information as to its physical nature which you know of?

A. No, I cannot, because it is impossible to tell how far away from the camera it might be. If it were on bottom, it would be about two feet, but it obviously is not on bottom--that is at the depth of the trigger weight, so there is no way of telling for sure...

Q. How large the object is?

A. How large the object is, yes, sir.

Q. Can you tell us the dimensions of the area covered by the overall picture?

A. I'm afraid I can't. This is only a portion of the negative that was printed because this was a very poor exposure.

Q. Have you seen the negative, Doctor?

A. I have seen the negative, yes.

Q. Could you estimate the portion, the dimensions of the area, from your knowledge of that negative?

A. I would estimate it's about three to five per cent of the area.

Q. This picture represents three to five per cent of the area in the negative?

A. Yes.

Q. What area did the negative cover?

A. If it were on bottom, it would cover a 20 foot diameter circle, but anything above bottom would cover proportionately less.

#### EXAMINATION BY THE COURT

Questions by a court member, RADM Daspit:

Q. Doctor, as I understand it, the camera is raised and lowered and when the trigger weight strikes the bottom, then it sets off the picture.

A. That is right.

Q. If the weight should strike the hull of the submarine, then it would set off the camera that far above the hull?

A. That is right. This is our objective--we hoped.

Q. On the picture of the tracks, there is a peculiar shadow effect; do you know in what direction the ship was moving in regard to the tracks?

A. Yes, sir. I know that but I don't know the orientation of the camera relative to the ship, so that I could not say. The camera is obviously on the nonshadowed side of the tracks. This is a ridge and the shadow is behind. The camera is over in this part of the picture. (indicating on Exhibit 241)

Neither the counsel for the court nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

All spectators were then asked to leave the courtroom and the court met with closed doors.

Charles R. Davis, Commander, U. S. Navy, was recalled as a witness for the court, was reminded that his previous oath was still binding and was examined as follows:

COUNSEL FOR THE COURT: This is a closed session of the court, Commander, and you are advised that you can introduce classified matter.

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Do you have in your possession an affidavit of Captain Patrick Leehey, U. S. Navy, for introduction in evidence before this court?

A. Yes, sir, I do. I have an affidavit given on 22 May 1963, classification Secret, from Captain Patrick Leehey, U. S. Navy, (b) (6), addressed to the President of this Court of Inquiry. This affidavit was duly signed, subscribed and sworn to before W. D. Chadwick, Commander, U. S. Navy, Acting Officer in Charge, U. S. Naval Submarine School, on the 22nd of May 1963, at the U. S. Naval Submarine School, New London, Groton, Connecticut, and came to me in due course as Assistant Counsel to this court.

The cited document was then offered in evidence by counsel for the court. There being no objection by the court, the document was received in evidence and marked as Exhibit 246. The court waived the reading of the exhibit at this time.

Q. Do you have in your possession the affidavit of Lieutenant Frederick A. Jones, of the Royal Canadian Navy?

A. Yes, sir, I do. I have an affidavit, classification Secret, from Lieutenant Frederick A. Jones, Royal Canadian Navy, (b) (6). This affidavit was duly signed by Lieutenant Frederick A. Jones before H. R. Lund, Commander, U. S. Navy, Chief Staff Officer, Commander Oceanographic System, Atlantic, on 20 May 1963, at Norfolk, Virginia, and came to me in due course as Assistant Counsel to this Court.

The cited document was then offered in evidence by counsel for the court. There being no objection by the court it was so received and marked as Exhibit 247. The court waived the reading of the exhibit at this time.

Q. Do you have in your possession a message from the U. S. Navy Oceanographic Office giving bathythermograph readings and conditions in the general area of THRESHER's loss?

A. Yes, sir, I do. This is a message 212124Z of May from the Navy Oceanographic Office, Washington, to Commander, Portsmouth Naval Shipyard, Portsmouth, New Hampshire, passed to the President, Court of Inquiry, USS THRESHER.

Q. Do you have also, associated with that, certain diagrams based on the information contained in the message?

A. Yes, sir, I do. (hands document to counsel for the court)

Q. Can you state the condition under which this diagram was prepared?

A. This diagram was prepared by Captain Reuben Woodall, U. S. Navy, and myself and is based upon the information contained in the message.

Q. Would you describe Captain Reuben Woodall's professional qualifications if you know them?

A. Captain Reuben Woodall is Officer in Charge, U. S. Naval Submarine School, New London, Connecticut, and he acted as technical advisor to the Court of Inquiry in the preparation of this document.

COUNSEL FOR THE COURT: I offer the message and the diagram prepared therefrom, to the court for the purpose of introducing them in evidence as one exhibit.

The cited documents were then offered in evidence by counsel for the court. There being no objection by the court, they were so received and marked as Exhibit 248. The court waived the reading of the documents at this time.

Q. Do you have in your possession the official death certificates of personnel embarked in THRESHER at the time of her loss?

A. Yes, sir, I do. This envelope contains the official death certificates and they came into my possession in due course as assistant counsel to this court. (hands documents to counsel for the court)

There being no objection by the court, the cited documents were received in evidence and marked as Exhibit 249. The court waived the reading of the exhibit at this time.

Neither the counsel for the court, nor the court desired to examine this witness further. The witness was then excused and resumed his seat in the courtroom as assistant counsel to the court.

Samuel Reece Heller, Captain, U. S. Navy, was recalled as a witness for the court, was reminded that his previous oath was still binding, and was examined as follows:

#### DIRECT EXAMINATION

Questions by counsel for the court:

Q. Captain Heller, do you have in your possession a book called the "Portsmouth Naval Shipyard Commander's Fact Book," which gives pertinent information regarding the Shipyard's organization and efforts?

A. Yes, sir.

Q. Produce it.

A. Yes, sir. (hands book to counsel for the court)

COUNSEL FOR THE COURT: I offer it to the court for the purpose of introducing certain excerpts therefrom.

There being no objection by the court, the document was then received in evidence. Pertinent excerpts therefrom, the reading of which was waived, are appended and marked as Exhibit 250.

Q. Captain Heller, do you have in your possession photographs of certain strainers from the high pressure air system of the submarine TINOSA?

A. Yes, sir, I do.

Q. Will you produce them please.

A. These are three views of the strainers removed from the **b(1)** reducing valves of TINOSA. (Hands photographs to counsel for the court)

Q. Would you very briefly state the circumstances of the operation which resulted in the condition of the strainers as exhibited in the photographs?

A. Yes, sir. We conducted, approximately a month ago, a full ballast blow with all banks charged to **b(1)** and blowing all main ballast tanks in the normal condition. Somewhere in the first two minutes of operation there was a marked drop in the pressure downstream of the reducing valves and a sensibly constant pressure upstream of it. Upon further examination we found the strainers at the inlet ports of these reducing valves to be in the condition portrayed on the photographs collapsed. The hypothesis, verified by temperature measurements, was that this was caused by a clogging of the strainers with frost and ice and eventually collapsing under the pressure that existed.

Q. To your knowledge, is TINOSA a ship of the THRESHER class possessing a similar high pressure air system to that employed in THRESHER?

A. Yes, sir.

COUNSEL FOR THE COURT: I offer these photographs to the court for the purpose of introducing them in evidence.

The cited photographs were then received by the court. There being no objection by the court, the photographs were received in evidence and marked as Exhibits 251, 252, and 253 respectively.

Q. Have you prepared, at the request of this court, a table of data giving water rates of various pumps and systems in THRESHER?

A. Yes, sir, I have. This is a tabulation of the flooding rate for three different depths through two different sized holes; the trim and drain pump capacity at the continuous rate and at the ten-minute overload rate for the same three depths; and the initial deballasting in the first minute with three air banks charged **b(1)** blowing all main ballast tanks for the same three depths.

Q. Did you prepare this?

A. Yes, sir, I did.

Q. Is it true and correct to the best of your knowledge?

A. Yes, sir.

COUNSEL FOR THE COURT: I offer it to the court for the purpose of introducing it in evidence.

The cited document was then received by the court. There being no objection by the court, it was received in evidence and marked as Exhibit 254. The court waived the reading of the document at this time.

Q. At the direction of the court, Captain, have you prepared certain additional computer studies based on a variety of flooding and speed assumptions in the case of THRESHER?

A. Yes, sir, I have.

Q. Would you produce them, please?

A. Yes, sir. These are the originals. There are 15 copies of each in the hands of the court reporters. (Hands documents to counsel for the court)

COUNSEL FOR THE COURT: I offer them to the court for the purpose of introducing them in evidence.

The cited documents were then received by the court. There being no objection by the court, the documents were received in evidence and marked as Exhibit 255. (1 through 6)

Q. With reference to Exhibit 255, were these prepared from information obtained from submarine diving trainers available to the Navy?

A. No, sir, these were prepared from data presented to me by a member of the court for the use of the Analog computer. There are certain similarities between submarine trainers and the Analog computer used at Portsmouth, but the submarine trainers do not have the same flexibility nor the same capacity; to wit, the trainers with which I'm familiar do not have the range of depth nor the ability to simulate flooding casualties. They do have the ability to produce different pitch angles and control surface evolutions and ballast blow.

Q. You are referring to submarine diving trainers, are you not, sir?

A. Yes, sir.

Q. Can you briefly describe to the court the studies which this Exhibit 255 portrays?

A. This was an effort to match an imposed time scale with a series of ordered trim angles to be maintained. The basic input was the ship at test depth at the start of the problem, with a down angle of five degrees, making eight knots and in a turn carrying a 20 degree rudder. At the start of the problem, a casualty was assumed to have occurred. Thirty seconds thereafter the order was given to go all ahead flank and ordered an up angle and this is one of the varying parameters. The ship was then assumed to accelerate in accordance with David Taylor Model Basin data until a minute and a half had gone by, at which time the power was lost and the ship began to decelerate again according to Model Basin data. Air banks were blown for a period of one and a half minutes during this ordered rise and then a second blow was started some three minutes after the loss of power. The curves presented here are the depth-time trajectories. This carries through for four of the sheets for different sized holes. And the last two sheets--



Q. Up to now you have been referring to Exhibit 255 (1) through (4). You are referring now to Exhibit 255(5) and 255(6), are you not?

A. Yes, sir. The last two sheets were what might be termed the most pessimistic conditions. They had a dive time scale and no speed acceleration, and the effort here was to find the size hole that matched the desired time scale for a required pitch angle to be maintained.

#### EXAMINATION BY THE COURT

Questions by a court member, Captain Osborn:

Q. Captain, Heller, you have made some studies previously before the court. One thing I would like to clear up: Have you received additional equipment, or does your computer on these last studies have a greater capability than the initial studies that you made?

A. The computer has been virtually doubled since the time we made the initial studies in mid-April.

Q. Would you say, as a matter of opinion, that the data presented in your last curves presented before the court today represent a better computer condition than those previously made?

A. Yes, sir. The flexibility has been enhanced several fold and the accuracy is much greater.

Neither the counsel for the court, nor the court desired to examine this witness further.

The president of the court informed the witness that he was privileged to make any further statement covering anything relating to the subject matter of the inquiry that he thought should be a matter of record in connection therewith, which had not been fully brought out by the previous questioning.

The witness stated that he had nothing further to say.

The witness was duly cautioned concerning his testimony and withdrew from the courtroom.

The court then closed at 1230 hours, 1 June 1963.

The court opened at 1300 hours, 1 June 1963. All parties connected with the inquiry who were present when the court closed were again present.

The court then adjourned at 1305 hours, 1 June 1963.

FORTY-THIRD DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
3 June 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1300, 3 June 1963.

The court opened at 1400, 3 June 1963. All persons connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 1810, 3 June 1963.

FORTY-FOURTH DAY

Portsmouth Naval Shipyard,  
Portsmouth, New Hampshire,  
4 June 1963.

The court met in executive session at 0830.

Present: All members of the court and the counsel for the court.

The court recessed at 1255, 4 June 1963.

The court opened at 1350, 4 June 1963. All persons connected with the inquiry who were present when the court recessed were again present.

The court adjourned at 2004, 4 June 1963.

FORTY-FIFTH DAY

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire  
Wednesday, 5 June 1963

The court met with open doors at 0920.

Present: All members of the court, counsel for the court, and  
(b) (6), reporter. RADM Palmer, party, and his counsel  
expressly waived their right to be present at this session.

Counsel for the court stated that he had completed the presentation  
of his evidence, and inquired whether the court desired to call any  
witnesses or to recall witnesses.

The court announced that it did not desire to call or recall any  
witnesses.

Counsel for the court waived argument.

PRESIDENT: Counsel for the court and the party having no further  
evidence or argument to present to this court of inquiry, the court is  
now adjourned to consider all the evidence and to submit to the convening  
authority its findings of fact, opinions and recommendations. The court  
will be closed.

The court closed at 0921, 5 June 1963.

Unclassified

The court, after inquiring into all the facts and circumstances connected with the incident which occasioned the inquiry, and having considered the evidence, finds as follows:

FINDINGS OF FACT

1. That the U.S.S. Thresher (SS(N)593) was built at Portsmouth Naval Shipyard, Portsmouth, New Hampshire, the first of a new class of nuclear powered attack submarines, capable of diving to a depth **b(1)** and with significant advances in sonar equipment, ability to resist shock, and to operate with reduced noise radiation. (U)

2. That THRESHER, under the command of Lieutenant Commander John W. HARVEY, U.S. Navy, **(b) (6)** /1100, departed Portsmouth Naval Shipyard, on the morning of 9 April 1963, to conduct scheduled sea trials following a post shake-down availability which extended from 16 July 1962 to 11 April 1963.

3. That THRESHER was a unit of Submarine Development Group TWO, and was operating under the orders of Commander Submarine Force, U.S. Atlantic Fleet (Administration) Portsmouth, for the sea trials.

4. That the following persons, in the status indicated, were on board THRESHER when she departed Portsmouth, New Hampshire, and were on board when she was lost:

HARVEY, John W.	LCDR	<b>(b) (6)</b> /1100	USN	USS THRESHER
GARNER, Pat M.	LCDR	/1100	USN	USS THRESHER
DI NOLA, Michael J.	LCDR	/1100	USN	USS THRESHER
LYMAN, John S., Jr.	LCDR	/1100	USN	USS THRESHER
SMARZ, John (n), Jr.	LT	/1100	USN	USS THRESHER
PARSONS, Guy C., Jr.	LTJG	/1100	USN	USS THRESHER
HENRY, James J., Jr.	LTJG	/1100	USN	USS THRESHER
BABCOCK, Ronald C.	LTJG	/1100	USN	USS THRESHER
WILEY, John J.	LTJG	/1100	USN	USS THRESHER
MALINSKI, Frank J.	LTJG	/1100	USN	USS THRESHER
COLLIER, Merrill F.	LT	/1100	USN	USS THRESHER
GRAFTON, John G.	LTJG	/1100	USN	USS THRESHER
KRAG, Robert L.	LCDR	/1400	USN	STAFF, DEPUTY COMMANDER SUBMARINE FORCE, U.S. ATLANTIC FLEET
ARSENAULT, Tilmon J.	ENCA(SS)-P2	<b>(b) (6)</b>	USN	USS THRESHER
BAIN, Ronald E.	EN2(SS)-P2		USN	USS THRESHER
BELL, John E.	MM1-P2		USN	USS THRESHER
BOBBITT, Edgar S.	EM2(SS)-P2		USN	USS THRESHER
BOSTER, Gerald C.	EM3(SS)-P1		USN	USS THRESHER
BRACEY, George (n)	SD3(SS)		USN	USS THRESHER
BRANN, Richard P.	EN2(SS)-P2		USN	USS THRESHER
CARKOSKI, Richard J.	EN2(SS)		USN	USS THRESHER
CAYEY, Steven G.	TM2(SS)		USN	USS THRESHER
CHRISTIANSSEN, Edward (n)	SN(SS)		USN	USS THRESHER
CLAUSSEN, Larry W.	EM2(SS)-P2		USN	USS THRESHER
CLEMENTS, Thomas E.	ETR3(SS)		USN	USS THRESHER

Unclassified

CUMMINGS, Francis M.	SOS2(SS)	(b) (6)	USN	USS THRESHER
CARMODY, Patrick W.	SK2		USN	USS THRESHER
DABRUZZI, Samuel J.	ETN2(SS)		USN	USS THRESHER
DAY, Donald C.	EN3(SS)		USN	USS THRESHER
DENNY, Roy O., Jr.	EM1(SS)-P2		USN	USS THRESHER
DiBELLA, Peter J.	SN		USN	USS THRESHER
DUNDAS, Don R.	ETN2(SS)		USN	USS THRESHER
DYER, Troy E.	ET1(SS)-P1		USN	USS THRESHER
DAVISON, Clyde E., III	ETR3-P1		USN	USS THRESHER
FORNI, Ellwood H.	SOCA(SS)-P1		USN	USS THRESHER
FOTI, Raymond P.	ET1(SS)		USN	USS THRESHER
FREEMAN, Larry W.	FTM2(SS)		USN	USS THRESHER
FUSCO, Gregory J.	EM2(SS)-P2		USN	USS THRESHER
GALLANT, Andrew J., Jr.	HMC(SS)		USN	USS THRESHER
GARCIA, Napoleon T.	SD1(SS)		USN	USS THRESHER
GARNER, John E.	YNSN(SS)		USN	USS THRESHER
GAYNOR, Robert W.	EN2(SS)		USN	USS THRESHER
GOSNELL, Robert H.	SA(SS)		USNR	USS THRESHER
GRAHAM, William E.	SOC(SS)-P1		USN	USS THRESHER
GUNTER, Aaron J.	QM1(SS)		USN	USS THRESHER
HALL, Richard C.	ETR2(SS)-P2		USN	USS THRESHER
HAYES, Norman T.	EM1-P2		USN	USS THRESHER
HEISER, Laird G.	MM1-P2		USN	USS THRESHER
HELSIUS, Marvin T.	MM2		USN	USS THRESHER
HEWITT, Leonard H.	EMCA(SS)		USN	USS THRESHER
HOAGUE, Joseph H.	TM2(SS)		USN	USS THRESHER
HODGE, James P.	EM2		USN	USS THRESHER
HUDSON, John F.	EN2(SS)		USN	USS THRESHER
INGLIS, John P.	FN		USNR	USS THRESHER
JOHNSON, Brawner G.	FTG1(SS)-P2		USN	USS THRESHER
JOHNSON, Edward A.	ENCA(SS)		USN	USS THRESHER
JOHNSON, Richard L.	RMSA		USN	USS THRESHER
JOHNSON, Robert E.	TMC(SS)-P1		USN	USS THRESHER
JOHNSON, Thomas B.	ET1(SS)-P2		USN	USS THRESHER
JONES, Richard W.	EM2(SS)		USN	USS THRESHER
KALUZA, Edmund J., Jr.	SOS2(SS)-P1		USN	USS THRESHER
KANTZ, Thomas C.	ETR2(SS)		USN	USS THRESHER
KEARNEY, Robert D.	MM3		USN	USS THRESHER
KEILER, Ronald D.	IC2(SS)-P2		USN	USS THRESHER
KIESECKER, George J.	MM2(SS)-P2		USN	USS THRESHER
KLIER, Billy M.	EN1(SS)-P2		USN	USS THRESHER
KRONER, George R.	CS3		USN	USS THRESHER
LANOUILLE, Norman G.	QM1(SS)		USN	USS THRESHER
LAVOIE, Wayne W.	YN1(SS)		USN	USS THRESHER
MABRY, Templeman N., Jr.	EN2(SS)-P2		USN	USS THRESHER
MANN, Richard H., Jr.	IC2(SS)		USN	USS THRESHER
MARULLO, Julius F., Jr.	QM1(SS)		USN	USS THRESHER
MC CLELLAND, Douglas R.	EM2(SS)		USN	USS THRESHER
MC CORD, Donald J.	MM1(SS)-P2		USN	USS THRESHER
MC DONOUGH, Karl P.	TM3(SS)		USN	USS THRESHER
MIDDLETON, Sidney L.	MM1(SS)-P2		USN	USS THRESHER
MUISE, Ronald A.	CS2		USN	USS THRESHER
MUSSELWHITE, James A.	ETN2(SS)-P2		USN	USS THRESHER

NAULT, Donald E.	CS1(SS)	(b) (6)	USN	USS THRESHER
NOONIS, Walter J.	RMC(SS)		USN	USS THRESHER
NORRIS, John D.	ET1(SS)-P2		USN	USS THRESHER
OETTING, Chesley C.	EM2-P2		USN	USS THRESHER
PENNINGTON, Roscoe C.	EMCA(SS)-P2		USN	USS THRESHER
PETERS, James G.	EMCS-P2		USN	USS THRESHER
PHILLIPPI, James F.	SOS2(SS)		USN	USS THRESHER
PHILPUT, Dan A.	EN2(SS)-P2		USN	USS THRESHER
PODWELL, Richard (n)	MM2-P2		USN	USS THRESHER
REGAN, John S.	MM1(SS)-P2		USN	USS THRESHER
RITCHIE, James P.	RM2		USN	USS THRESHER
ROBISON, Pervis (n), Jr.	SN		USN	USS THRESHER
ROUNTREE, Glenn A.	QM2(SS)		USN	USS THRESHER
RUSHETSKI, Anthony A.	ETN2		USN	USS THRESHER
SCHIEWE, James M.	EM1(SS)-P2		USN	USS THRESHER
SHAFFER, Benjamin N.	EMCM(SS)-P2		USN	USS THRESHER
SHAFFER, John D.	EMCS(SS)-P2		USN	USS THRESHER
SHIMKO, Joseph T.	MM1-P2		USN	USS THRESHER
SHOTWELL, Burnett M.	ETRSN		USN	USS THRESHER
SINNETT, Alan D.	FTG2(SS)		USN	USS THRESHER
SMITH, William H., Jr.	BT1-P2		USN	USS THRESHER
SOLOMON, Ronald H.	EM1-P2		USN	USS THRESHER
STEINEL, Robert E.	SO1(SS)-P1		USN	USS THRESHER
SNIDER, James L.	MM1		USN	USS THRESHER
VAN PELT, Rodger E.	IC1(SS)-P2		USN	USS THRESHER
WASEL, David A.	RMSN		USN	USS THRESHER
WALSKI, Joseph A.	RM1(SS)-P1		USN	USS THRESHER
WIGGINS, Charles L.	FTG1-P2		USN	USS THRESHER
WISE, Donald E.	MMCA(SS)-P2		USN	USS THRESHER
WOLFE, Ronald E.	QMSN(SS)		USN	USS THRESHER
ZWEIFEL, Jay H.	EM2-P1		USN	USS THRESHER
ALLEN, Philip H.	LCDR	(b) (6)	1400	USN PORTSMOUTH NAVAL SHIPYARD
BILLINGS, John H.	LCDR		1400	USN PORTSMOUTH NAVAL SHIPYARD
BIEDERMAN, Robert D.	LT		1400	USN PORTSMOUTH NAVAL SHIPYARD
PRESCOTT, Robert D. (b) (6)				Civilian Employee, Design Division, Portsmouth Naval Shipyard
CHARRON, Robert E. (b) (6)				Civilian Employee, Design Division, Portsmouth Naval Shipyard
GUERETTE, Paul A. (b) (6)				Civilian Employee, Design Division, Portsmouth Naval Shipyard
FISHER, Richard K. (b) (6)				Civilian Employee, Design Division, Portsmouth Naval Shipyard
WHITTEN, Laurence E. (b) (6)				Civilian Employee, Combat Systems Division, Portsmouth Naval Shipyard
BEAL, Daniel W., Jr. (b) (6)				Civilian Employee, Combat Systems Division, Portsmouth Naval Shipyard

Unclassified

DES JARDINS, Richard R. (b) (6)	Civilian Employee, Combat Systems Division, Portsmouth Naval Shipyard
CRITCHLEY, Kenneth J. (b) (6)	Civilian Employee, Production Department, Portsmouth Naval Shipyard
CURRIER, Paul C. (b) (6)	Civilian Employee, Production Department, Portsmouth Naval Shipyard
ABRAMS, Fred P. (b) (6)	Civilian Employee, Production Department, Portsmouth Naval Shipyard
PALMER, Franklin J. (b) (6)	Civilian Employee, Production Department, Portsmouth Naval Shipyard
DINEEN, George J. (b) (6)	Civilian Employee, Production Department, Portsmouth Naval Shipyard
MOREAU, Henry C. (b) (6)	Civilian Employee, Production Department, Portsmouth Naval Shipyard
CORCORAN, Kenneth R. (b) (6)	Contractor's Representative, Sperry Corporation
JAQUAY, Maurice F. (b) (6)	Contractor's Representative, Raytheon Corporation
KEUSTER, Donald W. (b) (6)	Contractor's Representative, Sperry Corporation
STADTMULLER, Donald T. (b) (6)	Contractor's Representative, Sperry Corporation

5. That the persons listed as being on board were military members of the naval service on active duty, civilian employees of the Portsmouth Naval Shipyard or civilian employees of activities under Government contract, as indicated.

6. That all persons on board THRESHER were on board for the purpose of executing official duties.

7. That U.S.S. Skylark (ASR20), under command of Lieutenant Commander Stanley HECKER, (b) (6) /1100, U.S. Navy, was designated to act as escort to THRESHER during sea trials, pursuant to orders of Commander Submarine Flotilla TWO. Commanding Officer, THRESHER, was Officer in Tactical Command.

8. That THRESHER's movement orders were CONFIDENTIAL; SKYLARK's were unclassified. Sea trial agenda, issued by Commanding Officer, THRESHER, were unclassified and were not held by SKYLARK. (U)

9. That THRESHER effected a rendezvous with SKYLARK at about 0949R on 9 April 1963 in the vicinity of Latitude 42-56 North, Longitude 70-26 West.

Unclassified



Unclassified

10. That on completion of a scheduled shallow dive, the two ships proceeded independently during the night to a second rendezvous in the vicinity of Latitude 41-46 North, Longitude 65-03 West. During the transit, THRESHER proceeded surfaced and submerged and conducted various test evolutions, including full power propulsion.

11. That at 0745R, 10 April 1963, SKYLARK was in the vicinity of Latitude 41-46 North, Longitude 65-03 West, and THRESHER reported to her that SKYLARK bore 147° True, 3400 yards from THRESHER.

12. That UQC (underwater telephone) provided the means of voice communication between the ships when THRESHER was submerged. SKYLARK was fitted with QHB-A type sonar equipment, having a maximum range scale of 3750 yards, but did not have sonar contact on THRESHER at any time on 10 April 1963. (U)

13. That SKYLARK carried a rescue chamber with a maximum depth capability of (b) (1) feet.

14. That the sea was calm, with a slight swell, at 0900R on 10 April. Wind was from 015° True at seven knots. Depth of water in this area is about 8500 feet. Visibility was about ten miles. No other ships are known to have been in the vicinity.

15. That at 0747R, THRESHER reported by underwater telephone that she was starting a deep dive. Depth for this dive had been set b(1) SKYLARK then maintained her approximate position. THRESHER reported course changes and depth changes, but SKYLARK did not plot THRESHER's position. (U)

16. That the deep dive appeared to SKYLARK personnel to proceed satisfactorily until about 0913R, when THRESHER reported to SKYLARK to the effect, "Experiencing minor difficulties. Have positive up angle. Am attempting to blow. Will keep you informed." (U)

17. That at about 0916R, SKYLARK heard a garbled transmission which was believed to contain the words "... test depth". An additional garbled transmission was received about 0917R, reported as containing the words "... nine hundred North". (U)

18. That Commander Oceanographic Systems Atlantic obtained information that THRESHER's main coolant pumps ceased functioning in "FAST mode" of operation at 0911R, and that a high energy, low frequency noise disturbance of the type which could have been made by an implosion emanated from THRESHER at 0918.1R. There were also indications of two disturbances, one extending from 0909.8R to 0911.3R, the other from 0913.5R to 0914R, which could have been made by the blowing of the ballast tanks. (U)

19. THRESHER was lost at sea with all on board at about 0918R on 10 April 1963, in the vicinity of (b) (1)

20. Bureau of Naval Personnel message 121935Z of April 1963 reported that determination had been made on 11 April 1963 under the Missing Persons Act (Title 50 Appendix, U.S. Code Annotated, section 1005), that all persons on board the U.S.S. THRESHER on 10 April 1963, died on 10 April 1963.

Unclassified

21. That there was no evidence of sabotage or enemy action in connection with the loss of THRESHER.

22. That upon receipt of the communication from THRESHER at 0913R, "Experiencing minor difficulty..." etc., SKYLARK initiated the following actions:

- a. Advised THRESHER that the area was clear.
- b. Advised THRESHER of SKYLARK's course and requested range and bearing from THRESHER.
- c. Asked THRESHER at about 0915R, "Are you in control?" and repeated this query.
- d. Established LORAN position (logged at 0921R as 41-45N 64-59W).
- e. Attempted to establish communication by underwater telephone, sonar and radio.
- f. At 1040R commenced dropping series of hand grenades indicating to THRESHER that she should surface.

23. That at about 1045R, SKYLARK began preparation of a message reporting the loss of contact with THRESHER.

- a. At about 0940R, when the Operations Officer had asked the Commanding Officer if he should send such a message, the reply was to the effect that, "It is too early."
- b. At about 1045R, the Commanding Officer, SKYLARK directed the Operations Officer to initiate the message.
- c. Although SKYLARK had conducted radio communication checks with NBL (Radio New London) earlier on the morning of 10 April, difficulty was reported at the time of transmission of the message. SKYLARK shifted to an alternate frequency.
- d. NBL receipted for the message at 1245R.

24. That SKYLARK's message, 101604Z, stated, "UNABLE TO COMMUNICATE WITH THRESHER SINCE 0917R. HAVE BEEN CALLING BY UQC VOICE AND CW QHB CW EVERY MINUTE EXPLOSIVE SIGNALS EVERY 10 MINS WITH NO SUCCESS. LAST TRANSMISSION RECD WAS GARBLED. INDICATED THRESHER WAS APPROACHING TEST DEPTH. MY PRESENT POSITION 41-43N 64-57W CONDUCTING EXPANDING SEARCH."

25. SKYLARK message 101604Z did not convey to operational commanders the full extent of the information available.

- a. Although inclusion of additional information such as the 0913R UQC transmission "Experiencing minor difficulty..." etc., was suggested by the Operations Officer, the Commanding Officer decided not to include such information.

- b. SKYLARK did not include such additional information in any subsequent reports.

26. That on 10 April 1963, Commander Submarine Force, U. S. Atlantic Fleet (Vice Admiral E. W. Grenfell, USN) was in Annapolis, Maryland, in a duty status, delivering a submarine presentation. His administrative headquarters remained in Norfolk, Virginia. Vice Admiral Grenfell returned to Norfolk at about 1420R. At 1435R he was advised of THRESHER's status.

27. That on 10 April 1963, Deputy Commander Submarine Force, U. S. Atlantic Fleet (Rear Admiral L. P. Ramage, USN) was en route to New London, Connecticut from Key West, Florida. He had been conducting an inspection of units at Key West. He arrived at Trumbull Airport, Groton, Connecticut, at about 1830R. He proceeded by helicopter to Newport, Rhode Island and embarked in the U.S.S. Blandy to proceed to the scene of the search.

28. That on 12 April 1963, the Court of Inquiry requested that SKYLARK witnesses and records be made available as soon as possible to acquaint the court with the details of the last transmission from THRESHER and the best knowledge of her last known movements.

- a. Deputy Commander Submarine Force, U. S. Atlantic Fleet, was relieved as search force commander (CTG 89.7) by Commander Submarine Development Group TWO at about 1630R on 12 April. Lieutenant (jg) James D. Watson, USN, Navigator of SKYLARK, two enlisted men, and necessary SKYLARK logs were transferred to BLANDY for return to Newport to permit appearance before the Court of Inquiry.
- b. Shortly after the transfer to BLANDY, Rear Admiral Ramage interviewed Lieutenant (jg) Watson and examined the UQC (underwater telephone) log. Upon seeing the UQC log, Rear Admiral Ramage became knowledgeable for the first time of the last communications from THRESHER. This information had not previously been communicated to him or to anyone outside SKYLARK.
- c. Rear Admiral Ramage advised Commander Submarine Force, U. S. Atlantic Fleet by message of the substance of the last UQC transmissions.
- d. This information from SKYLARK was made known to the Court of Inquiry in testimony on 13 April 1963.

29. That shortly after 0917R, when efforts to communicate with THRESHER had been unsuccessful, SKYLARK commenced an expanding search pattern. The QHB-A sonar was the principal means of underwater detection available to SKYLARK.

Unclassified

30. That SKYLARK was joined in the search area by patrol aircraft and by the U.S.S. Recovery (ARS-43) during the afternoon.

31. That at about 1730R, RECOVERY sighted an oil slick about seven miles to the Southeast of SKYLARK's 0917R position.

32. That samples were collected and articles of debris were recovered. These items and debris subsequently recovered were examined by laboratory personnel of the Portsmouth Naval Shipyard and were determined to be materials which could have come from THRESHER.

33. That radiation measurements were taken in the search area by surface ships and submerged submarines. Water samples and the recovered debris were examined by laboratory personnel. No radioactivity beyond normal background level was found to exist in the search area or in any of the material examined.

34. That additional ships and aircraft were employed in the search effort. Command of the search force passed from Commanding Officer, SKYLARK, to Commander Submarine Development Group TWO at about 0530R on 11 April 1963, and was subsequently exercised, for varying and consecutive periods, by Deputy Commander Submarine Force, U. S. Atlantic Fleet, Commander Submarine Development Group TWO and Commander Submarine Squadron EIGHT.

35. That while operating as a unit of the search force, the U.S.S. Seawolf (SSN575) recorded possible electronic emissions and underwater noises. None of the signals which SEAWOLF received equated with anything that could have been originated by human beings.

(U)

36. That Naval units and personnel were assisted by civilian scientists and research ships. The search for THRESHER is continuing.

Unclassified

Unclassified

37. That THRESHER was designed by the Bureau of Ships, assisted by Portsmouth Naval Shipyard in contract design phase (1957-1958); working plans were developed by Portsmouth Naval Shipyard (1958-1959).

38. That Portsmouth Naval Shipyard built THRESHER, starting in 1958. Initial sea trials were held on 30 April 1961 to 2 May 1961, but were aborted at b(1) by instrumentation deficiencies. Severe water hammer was experienced, resulting in an extensive program of hydraulic shock and impulse tests on trim and drain and auxiliary sea water systems. Special operating procedures were prescribed for the trim and drain system. The next sea trial, fully instrumented, commenced on 22 May 1961, was fully successful, and the hull stresses measured confirmed stresses predicted by earlier model tests.

(U)

39. That there were several design reviews of THRESHER Class during the building period. The Chief of Naval Operations review in March, 1959, was one such review.

40. That THRESHER was commissioned and delivered on 3 August 1961; the condition of the ship was defined by the certificates of condition furnished by the Commander, Portsmouth Naval Shipyard and the report of the Board of Inspection and Survey. In general, the ship was built in accordance with specifications and was in generally good material condition.

41. That HY-80 steel has been used in the construction of all nuclear submarines, including THRESHER, since the streamlined single screw hull was adopted. Nuclear submarines make many more excursions to test depth than battery submarines have made in the past. This increased number of cycles and the paucity of knowledge in the fatigue strength of HY-80 require periodic surveillance of submarine hulls.

(U)

42. That THRESHER's main propulsion plant consisted of a model S5W nuclear power plant.

(U)

43. That silver braze joints and flexible hose connections were extensively used in vital piping systems throughout the ship in accordance with usual submarine building practice and the specifications.

44. That the factors of safety relative to test depth of the compartments in THRESHER were as follows:

- Engine Room . . . . . (b) (1)
- Auxiliary Machinery Space . . . . .
- Control Space and Reactor Compartment . . . . .

(U)

45. That a high pressure hydraulic system similar to those in preceding streamlined, single screw submarines, was installed in THRESHER to provide the forces required under high speed maneuvering conditions.

(U)

Unclassified

Unclassified

46. That as compared to the SKIPJACK, the immediately preceding class of attack submarine, THRESHER had:

- a. An increase in test depth from 700 feet to b(1)
- b. About the same reserve buoyancy.
- c. About the same high pressure air bank capacity.
- d. While at test depth:

(1) A reduction in the amount of ballast which could be blown from (b)(1) per cent to (b)(1) per cent.

(2) A reduction in the rate of blowing ballast from (b)(1) tons per minute to (b)(1) tons per minute.

(U)

47. That the increasing operating depths of submarines has compressed the time available in which to take effective damage control action with respect to flooding. The shortness of time available to control flooding is not well recognized. The table below indicates, for THRESHER, in tons per minute, the rates at which water can enter through a leak, the maximum rate at which it can be discharged by drain pump or by blowing tanks, and the ratio of maximum rates of taking in water to getting rid of it.

Depth in Feet	Flooding Rate Size Hole Inches		Discharge Rate Drain Pump / Air Blow		Maximum Ratio Flooding to Discharge 2" Hole
	2"	4"			
400	6.0	24.0	1.2	15.4	.4
700	7.9	31.7	1.1	12.4	.6

b(1)

All rates in tons per minute.

(U)

48. That the Bureau of Ships design criteria for air system ballast tank blow capacity is that there should be capability to blow all main ballast tanks twice at periscope depth, fire all torpedoes or other weapons, and have a remaining pressure in the banks of b(1). There is no modification to this criteria for depth of blowing or for test depth of the ship involved. There are no requirements relative to the mechanical design of systems which would prevent the formation of blockages due to ice which may form during an extended blow. There was no provision for emergency deballasting by means other than air. Dehydrators were not installed.

(U)

49. That the b(1) reducing valves in the main ballast tank blow system of THRESHER were fitted with conical mesh strainers.

(U)

50. That in blowing the main ballast tanks of submarines operating at shallower depths, the tanks can be blown completely dry in a relatively short time. In blowing the tanks of submarines designed for deeper test depths, all of the air in the banks can be used without emptying

Unclassified

the ballast tank. This requires a sustained period of blowing. (U)

There is no requirement in the specifications for building ships to completely blow down the air banks through the main ballast tank blowing system. There have not been promulgated any test results which show as a result of such a full blow down:

- a. The temperature of various components of the air blowing system.
- b. The workability of components at these temperatures with frozen moisture from the air system complicating the situation.
- c. The low temperature effects on the blow system piping and component materials.
- d. The required air dryness to prevent icing.

Under a test required by the court, strainers in the reducers of the TINOSA were blocked and ruptured by the formation of ice in about thirty seconds. (U)

51. That the high pressure air system of THRESHER Class submarines was so designed that in event of loss of electrical power to the ballast control panel, air banks 2, 3 and 4 would automatically be shut off and air bank #1 would be opened up slowly. It takes thirty seconds to get valves fully open again; this is because of the 200 psi/sec. allowable pressure rise to prevent dieselization; thus after loss of electrical power or significant voltage drop, there is no air blowing capability for some period between 10-50 seconds. (U)

52. That all sea water system hull and stop valves in THRESHER could not be remotely operated at two separate stations using hydraulic operators, and there was no specified requirement for this capability. (U)

53. That the auxiliary sea water system in THRESHER was a high pressure system, consisting of two six-inch supply headers and two four-inch discharge headers so arranged in the ship to provide for a loop operation. (U)

54. That the Ship Information Book and working plans for THRESHER Class auxiliary sea water system call for cross connection of this system as the normal mode of operation. Under this condition it can be necessary to close sea valves in both the auxiliary machinery space and the machinery space to stop a leak in either. (U)

55. That the constant vent system in THRESHER was directly connected to the auxiliary sea water system and utilized piping, flexible hoses and flexible couplings from the various components to join them to the auxiliary sea water piping system. This cross-connected the auxiliary sea water system. (U)

Unclassified

Unclassified

56. That the normal operating mode of constant vents as set forth in the Ship Information Book and plans for THRESHER is for them to be open. (U)
57. That the specifications for building submarines do not require a low pressure auxiliary sea water system. (U)
58. That the normal operating modes of the auxiliary sea water, main sea water, air conditioning and trim and drain valves in THRESHER called for them to be fully open to reduce friction losses and noise in the systems. (U)
59. That vital electrical switchboards installed in THRESHER were protected from water dripping, but not fully from spray from below or from mechanical derangement from a water stream. (U)
60. That certain alternate and supplementing identical equipments were located in close proximity to each other. For example the two lube oil pumps for each ship's service turbogenerator set on THRESHER Class are set in a lower level pocket just to port and starboard of the centerline near Frame 81; control oil for ship's service turbogenerator throttles is supplied by these lube oil pumps. The 400-cycle motor generator sets are located in close proximity in the engine room. (U)
61. That the b(1) KW ship's service motor generator sets and their electrical switching and other connections are located in the auxiliary machinery space in close proximity. They provide for conversion of b(1) volt A. C. to b(1) volt D.C. under normal conditions of the Ship's Service turbogenerator sets providing power, or, when power is provided by the battery or the diesel generator, convert b(1) volt D.C. to b(1) volt A.C. Much of the ship's vital electrical and indicating equipment is supplied from b(1) volt A.C. sources (or transformed therefrom). (U)
62. That a casualty to BARBEL during the latter stages of THRESHER's construction, focused attention on the inadequacy of quality assurance methods employed in fabrication of silver braze joints in submarine construction by Portsmouth Naval Shipyard prior to 1961. (U)
63. That subsequent to an investigation of the BARBEL casualty, silver braze joints in THRESHER's vital systems were subjected to visual examinations, mallet tests, chemical material re-identification tests, hydrostatic tests and hydraulic pressure cycling tests.
64. That there was no extensive retrofit of silver braze joints in THRESHER.

Unclassified



Unclassified

65. That quality assurance procedures employed at Portsmouth Naval Shipyard during THRESHER's construction period, consisted in general of mechanic and line supervision, with some system tests being conducted by inspectors.

66. That hull production processes during THRESHER's building period did not include the use of all the techniques and safeguards for hull surveillance which now exist.

67. That the ultrasonic method of testing silver braze joints was not available for use during THRESHER's construction period.

68. That during THRESHER's construction, x-ray techniques were used extensively for non-destructive testing of welds, forgings and castings. Some ultrasonic testing was used to detect internal flaws in steel plates. To supplement these techniques, and wherever possible, hydrostatic pressures were applied to pressure vessels and piping systems. These test pressures were, in general, one hundred and fifty per cent of the designed working pressures. In the case of those piping systems exposed to sea pressure, this test pressure was (b) (1)

Hydrostatic pressure testing is a standard engineering technique and was the best non-destructive method of testing silver braze piping joints available at the time of THRESHER construction.

69. That the Ship Information Books (S.I.B) for THRESHER were prepared by an outside firm under subcontract from the Portsmouth Naval Shipyard; the subcontractor used an SS(N) 588 Class Ship Information Book as a guide and virtually copied large portions of it, although many systems on THRESHER were quite different. The THRESHER Ship Information Book was, accordingly, not approved by the Bureau of Ships; a temporary book was provided. The finally approved version was not available to THRESHER even at the end of the post shakedown availability.

(U)

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70. That following commissioning, THRESHER conducted operations in the Eastern Atlantic area, for the purposes of shakedown, training and evaluation.

71. That this was a much longer operating period than is normal before a post shakedown availability, and was provided because of the need to test the many new developments and equipments incorporated into THRESHER.

72. That THRESHER conducted about 40 dives to test depth <sup>b(1)</sup> during this period. (U)

73. That from 16 April 1961 to 21 May 1962 THRESHER visited the Electric Boat Division of General Dynamics Corporation, Groton, Connecticut, for instrumentation and shock hardening in preparation for scheduled shock tests.

74. That during this availability, 115 silver brazed joints in her hydraulic systems were tested by ultrasonic means. Of these, eight did not meet all requirements of then existing bonding standards. Two of these joints were replaced. The remaining six were accepted after decision by the Bureau of Ships that the existing deficiencies were not such as to warrant replacement. (U)

75. That these six joints all satisfactorily withstood the shock tests which followed. (U)

76. That during a visit to Cape Canaveral in early June, THRESHER was struck by a tug and suffered damage to the exterior plating of one of the main ballast tanks.

77. That THRESHER returned to the Electric Boat Division, where all damage was repaired.

78. That a thorough inspection revealed no damage to the pressure hull nor any damage which affected the safety of the ship.

79. That shock tests of THRESHER were conducted in the Key West area during the period 17 - 29 July 1962. (U)

80. That the shock tests involved detonation of ten thousand pound charges at ranges varying from 1180 feet to 370 feet. (U)

81. That the maximum shock factor was (b) (1) the hull shock lethality factor for THRESHER was calculated at (b) (1) thus the ratio of shock applied to that required for hull deformation of THRESHER was one-sixth. (U)

82. That similar shock tests have been conducted against other submarines, including nuclear submarines. (U)

83. That the shock factor (relationship between the weight of the charge, and the slant range) was slightly higher for THRESHER than for any other submarine in the earlier tests. (U)

Unclassified

Unclassified

84. That during THRESHER's shock tests, there was no loss of main power, and no hull rupture was suffered. (U)

85. That a number of derangements occurred to joints, fittings, bolts, rivets, straps and some machinery foundation elements. (U)

86. That although an inspection was made and damaged items were scheduled for repair during the post shakedown availability, additional items continued to become evident, even in the late stages of the availability. (U)

87. That several days after the shock tests, THRESHER made a dive to <sup>b(1)</sup> during which a minor leak was discovered in the #2 PUFFS hydrophone weld. (U)

88. That depth was limited to less than 200 feet until the post shakedown availability when the nature of the damage could be determined. (U)

89. That full power trials were conducted en route to Portsmouth, New Hampshire, for post shakedown availability.

90. That THRESHER arrived at Portsmouth 11 July 1962.

91. That the commanding officer's evaluation of the first year of operations is contained in his letter, serial 086 of 16 November 1962.(Ex. 111). (U)

a. He called THRESHER "the best ASW submarine afloat today."

b. He pointed out THRESHER's deficiencies, highlighting the following:

(1) Overly complex in many areas.

(2) Difficult to handle on surface or near surface.

(3) Vulnerability of auxiliary sea water system.

c. He stated, "In my opinion the most dangerous condition that exists in THRESHER is the danger of salt water flooding while at or near test depth."

92. That post shakedown availability commenced on 16 July 1962, with an estimate of approximately 35,000 man-days and a scheduled duration of six months.

93. That major jobs originally scheduled for post shakedown availability included hard tank stiffening, conversion of hydraulic systems from cellulose to petroleum based oil, items based on findings of the Board of Inspection and Survey, and repairs found necessary as a result of inspections to be made for shock trial damage. (U)

94. That the post shakedown availability grew by addition of new work, including a large job involving the PUFFS (Passive ranging sonar) equipment, extensive items pertaining to additional noise reduction, and other modifications. (U)

Unclassified

Unclassified

95. That THRESHER's post shakedown availability completion date was successively extended from 18 January to 15 February, to 28 February, to 30 March, to 2 April, and finally to 11 April, because of work added and the under-estimation of the effects of new and old work. The total of man-days expended was over 100,000.

96. That damage to THRESHER caused by shock tests was intensively investigated by ship's force, Bureau of Ships, and Shipyard personnel after the tests, during sound trials and transits, and on return to Portsmouth Naval Shipyard. Despite such efforts, shock damage continued to be found during the entire post shakedown availability. Of significance was the discovery of loose condenser foundation bolts in January, 1963, and a misaligned torpedo ejection pump in March, 1963. This pattern of continuing discovery of shock damage during post shakedown availability parallels that found in SKIPJACK and SKATE in similar extended availabilities after shock trials. (U)

97. That at THRESHER's arrival conference, a visual and ultrasonic surveillance of sil-braze joints 2 inches and larger in sea water systems which were unlagged and accessible was placed on a not-to-delay vessel basis. (U)

98. That by letter to the Commander, Portsmouth Naval Shipyard dated 28 August 1962, the Bureau of Ships (Exhibit 115):

- a. Called attention to the fact that gross failures of sil-brazed joints in vital submarine systems made it a matter of urgency to develop an inspection program for them. (U)
- b. Directed Portsmouth Naval Shipyard to "employ a minimum of at least one ultrasonic test team throughout the entire assigned post shakedown availability to examine, insofar as possible, the maximum number of sil-braze joints."
- c. Requested Portsmouth Naval Shipyard to forward comments, suggestions and recommendations based on results of the tests.

99. That job orders issued for the surveillance inspection called for use of one ultrasonic test team, to test first those joints not lagged, and provided that if time permitted thereafter, lagging would be removed to permit tests of additional joints. (U)

100. That the job orders called for periodic reports of results of tests to the Planning and Estimating and Design Divisions. (U)

Unclassified

Unclassified

101. That the periodic reports of sil-braze inspections were not forwarded as requested. Condition sheets of individual defects were forwarded. (U)
102. That by 29 November 1962, 145 old joints had been ultrasonically tested in the surveillance program, with a rejection rate of 13.8 per cent. (U)
103. That the standard prescribed by the Bureau of Ships for acceptance of a sil-braze joint by ultrasonic test was 40 per cent bond, 25 per cent minimum, either land. (U)
104. That on 29 November 1962, the Quality Assurance Division reported the results of the survey of old joints to Planning and Estimating Division and requested decision as to whether lagged joints should be unlagged for testing. (U)
105. That decision was made on 4 December 1962 not to unlag and ultrasonically test additional old joints in THRESHER. This decision was known to the management personnel of the Shipyard, including the Production Officer and the Commander, who were apprised of the results of the survey. (U)
106. That a copy of this decision was furnished the Commanding Officer of THRESHER. (U)
107. That no further ultrasonic testing of old sil-braze joints was conducted pursuant to this program after 29 November 1962. (U)
108. That neither the results of the surveillance nor the decision not to proceed further with ultrasonic tests of old joints was made known to the Bureau of Ships or to anyone in the operational command line higher than the Commanding Officer of THRESHER. (U)
109. That Portsmouth Naval Shipyard management and workers exhibited a high degree of confidence in sil-braze joints in THRESHER's piping systems.

Unclassified

Unclassified

110. That the results of ultrasonic tests on sil-braze joints in SCULPIN and SKIPJACK during shipyard availabilities were as follows:

<u>Ship</u>	<u>Shipyard</u>	<u>Approximate Date</u>	<u>Joints Tested</u>	<u>Rejected Joints</u>
SCULPIN	Mare Island	April 1962	387	22.2%
SKIPJACK	Portsmouth	August 1962	322	22.5%

(U)

111. That prior to THRESHER's post shakedown availability, there had been reports of serious failures of sil-braze joints in BARBEL, SKATE, SNOOK, SCULPIN, ETHAN ALLEN and THRESHER. (The SKATE casualty occurred on a polar cruise at 600 feet under the ice when a 3-inch sil-braze joint parted; the BARBEL casualty was a failure of a 5-inch sil-braze joint during a dive.)

(U)

112. That the approximate number of sil-braze joints in an S5W reactor equipped ship is over 3000 of 2-inch size and above in hazardous systems.

(U)

113. That results of the ultrasonic tests of sil-braze joints in SKIPJACK were not reported by Portsmouth Naval Shipyard to the Bureau of Ships, Deputy Commander Submarine Force, U. S. Atlantic Fleet, or higher authority.

(U)

114. That flexible hoses were replaced during THRESHER's availability in accordance with process instructions existing in the Shipyard.

115. That the process instructions did not fully define specifications for allowable twist.

116. That a training program existed for making up flexible hoses.

117. That no formal training program existed for installing flexible hoses.

118. That some flexible hoses were twisted in initial installation, but were corrected.

119. That an inspection program for flexible hose installations existed and was carried out.

120. That a comprehensive flexible hose listing was prepared for THRESHER. This was used for quality assurance planning and inspection.

121. That some valves in THRESHER's hydraulic, auxiliary sea water and other systems were installed backwards during the post shakedown availability to permit testing of systems, some due to inadvertence and one due to an error in the ship's plans; however, all were corrected and properly installed prior to departure of the ship for sea trials.

122. That the Ship Information Book and working plans for THRESHER's auxiliary sea water system call for cross-connection of the system as the normal operating mode. Installation of new check valves in the constant vent portion of this system during the post shakedown availability made possible complete separation of the auxiliary sea water system into two loops.

Unclassified

Unclassified

123. That high pressure air and hydraulic systems require a high order of small particulate matter rejection during fabrication, installation and repair.

124. That difficulties were experienced in operating the high pressure air system, and in leakage from the reducing valves. These difficulties, which began early in the life of the ship and extended throughout the post shakedown availability, appeared to stem from the presence of minute particles in the system.

125. That the difficulties with the high pressure air valves, particularly leakage and venting, were reported as having been corrected prior to sea trials.

126. That the hull repairs, access patches and hull stiffening work was done in accordance with existing Bureau of Ships instructions and was checked by non-destructive test means as being satisfactory.

127. That the hull surveillance inspection scheduled during the post shakedown availability was completed.

128. That after the final system test of the auxiliary sea water system aft, Reserve Feed Tank No. 2 was over-pressurized on 8 March 1963. (U)

129. That the Reserve Feed Tank top was displaced one to two inches by over-pressurization and the ship's 8000 gallon-per-day distiller was also displaced. (U)

130. That the drain line and other lines mounted on the reserve feed tank top were affected by the displacement of the top. (U)

131. That the distiller was restored to its proper position and checked by visual, hydrostatic and short operational test. (U)

132. That the reserve feed tank was repaired and tested by pressure and other non-destructive tests. (U)

133. That based on a decision that no overstress problem was involved, drain and other lines on the tank top were not tested, nor were stress calculations made prior to sea trials. (U)

134. That stresses calculated after the loss of THRESHER by two separate activities indicated that stress levels on the drain and other lines mounted on the tank top were not excessive. (U)

135. That the auxiliary sea water system aft was not retested following the casualty to the reserve feed tank. (U)

136. That documentation of ship's systems, components and normal operating modes was not delivered to THRESHER by the end of her construction period. It was never made complete and accurate in all respects. (U)

Unclassified

Unclassified

137. That detailed damage control studies of flooding casualties, consequences, and recommended actions were not required by the building specifications for THRESHER. (U)

138. That the first dockside simulated operational cruise for purposes of crew training (fast cruise) was held 23-26 March 1963, and was terminated because of the large number of material deficiencies noted; the second and last "fast cruise" was begun on 31 March and satisfactorily completed on 1 April 1963.

139. That Atlantic Fleet Submarine Force Instructions did not require and THRESHER's sea trial agenda for deep dives on 10 April 1963 did not provide for, operation of sea valves at various depths prior to proceeding to test depth for the first time after her post shakedown availability. (U)

140. In the second "fast cruise", during one of the drills involving a simulated flooding casualty in the after auxiliary sea water system, it required twenty minutes to isolate a leak. This was one of the early drills. Changes had been made in the system involved during the post shakedown availability.

141. That sea valves which are operable on the surface or at shallow depth sometimes bind at deeper depths, particularly after modification or overhaul. There was no evidence to indicate that THRESHER planned to test the operation of sea valves at various intermediate depths en route to test depth on her first deep dive. There is evidence that it was planned to do this on a second scheduled dive to deep depth. (U)

142. That THRESHER was at the Sound Pier for sound trials during the period 1 April to 4 April, and in drydock from 4 April to 8 April 1963, to make repairs to torpedo door shutters and main circulating water valve MSW5. During this period liberty was granted to the crew.

143. That testing of systems was in accordance with Portsmouth Naval Shipyard Instruction 4855.2 and the substance of Portsmouth Naval Shipyard Instruction 4730.8 (of March 1963), and other applicable instructions. A comprehensive test program was conducted.

144. That the number of people in the quality assurance program in the Portsmouth Naval Shipyard has increased from 152 to 243, and the direct expenditures for the program from approximately \$1,200,000 to approximately \$2,800,000 in the past two years.

145. That all work undertaken by the Shipyard during THRESHER's post shakedown availability was reported as having been completed satisfactorily, and the Commanding Officer expressed his concurrence that the work was complete.

146. That Portsmouth Naval Shipyard has had an extensive training program over the past two years, expending about \$1,300,000 in the Shipyard, of which the Pipe Shop (56) portion was about \$400,000.

147. That during THRESHER's post shakedown availability, the total work effort performed at Portsmouth Naval Shipyard also included construction of five submarines, one submarine conversion and the overhaul and repair of five submarines; other minor ship repair work and some manufacturing work was accomplished.

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148. That starting in 1962 there was a joint identification plant prepared by shipyards for new construction submarines.

149. That at the Portsmouth Naval Shipyard there is no standard method for maintaining in one place, on or near a ship, a documented status of ship's systems as regards operational status, components removed, components unusable, restrictions, etc; such a procedure is often called a "rip out" procedure. It involves authorization documents, instructions for tagging of removed components, assignment of component responsibilities, etc. (U)

150. That Portsmouth Naval Shipyard has authority to deviate from building specifications in certain areas, and is using the specifications as goals rather than requirements in certain cases.

151. That workers and management at Portsmouth Naval Shipyard are not in all cases adhering to the process and procedure documents to insure the benefits which derive from such documents. (U)

152. That Portsmouth Naval Shipyard considers the state of cleanliness of Shop 56 (Piping Shop) not adequate to permit work of requisite quality. This was confirmed by a view of the premises taken by the Court. The Shipyard is constructing "clean room" facilities for manufacture and assembly of air and hydraulic piping systems. (U)

153. That during the course of proceedings, a test demonstration for the Court of Inquiry was held in Drydock No. 2 at the Portsmouth Naval Shipyard. A stream of water was released to atmosphere at THRESHER's test depth pressure against a piece of electronic equipment. The stream produced tremendous force, spray, fog and noise.

154. That there were a number of submarine flooding casualties which preceded the loss of THRESHER. Among them were: (U)

- a. THRESHER - First builder's trials - a b(3) 10 USC 130 salt water sil-braze vent line joint failed. Second builder's trials - a one inch trim system priming line failed.
- b. ETHAN ALLEN - Builder's trials - electrical switchboards were sprayed, b(1) and minor fires ensued when a threaded plug blew out of a trim line priming line strainer.
- c. SNOOK - First builder's trials - three grease lines passing through the after engine room bulkhead carried away. A one and one-quarter inch nipple in the high pressure air compressor cooling water discharge pulled out of a pipe boss at test depth. Subsequent inspection revealed a leaking sil-braze joint in a five-inch line.

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- d. ARGONAUT - Failure of a flexible hose fitting flooded after engine room.
- e. CAIMAN - Failure of a four-inch flexible hose near test depth caused flooding of forward engine room.
- f. BARBEL - Failure of a five-inch sil-braze joint.
- g. SKATE - Failure of a b(3) 10 USC 1 sil-braze joint in the b(3) 10 USC 130 water line under ice at 600 feet.
- h. NAUTILUS - Failure of a flexible coupling in the suction line to a sea water circulating pump while at test depth.

155. That the complexity of modern submarines has increased at a rapid rate. The advent of nuclear propulsion, ballistic missiles, and greatly increased speeds and operating depths has made it essential that all information affecting their safe operation be analyzed and promptly disseminated.

156. That Commander Submarine Force, U. S. Atlantic Fleet, has a system of disseminating information which affects submarine operational safety.

157. That there is at present no organization at any level within the Navy with the sole responsibility for submarine safety.

158. That submarine diving trainer equipment does not have the capability to simulate the attendant effects of large flooding and associated damage control situations for training. (U)

159. That all submarines are now restricted to a maximum depth of 500 feet. (U)

160. That during the past four years, the Navy's annual shipbuilding program has increased from approximately \$2,500,000,000 to \$4,500,000,000.

161. That during the past four years, the civilian personnel ceiling of the Bureau of Ships in Washington, D. C. has been reduced from 3800 to 3100.

162. That during the period from 1959 to 1963, the number of naval officers designated for Engineering Duty (ED) has declined from 1057 to about 840.

163. That the number of naval officers serving as technical and management officers in the Portsmouth Naval Shipyard has been reduced over the past few years. This is particularly serious in the Design Division where, in 1956, five Assistant Design Superintendents were assigned - none is so assigned today; and in the Shipbuilding and Repair Division, where the loss of ten qualified officers (mainly ED) in 1961 and 1962 has reduced capabilities.

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164. That during recent years, the advent of the nuclear submarine has resulted in a major increase in the complexity and difficulty of submarine design, construction and maintenance.

165. That the increase in complexity of nuclear submarines has resulted in an appreciable increase in the responsibilities imposed upon their commanding officers during the construction and post shakedown availability periods.

166. That the following changes of key personnel were effected during THRESHER's post shakedown availability:

- a. There was a change of THRESHER's Commanding Officer in January, 1963.
- b. There was a change of THRESHER's Executive Officer in January, 1963.
- c. There was a change of THRESHER's Ship Superintendent in December, 1962.
- d. There was a change of THRESHER's Assistant Ship Superintendent in November, 1962.

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## OPINIONS

1. That the loss of the U.S.S. THRESHER was in all probability due to:
  - a. An initial flooding casualty from an orifice between 2" and 5" in size in the engine room, which continued, compounded by
  - b. Loss of reactor power due to an electrically-induced automatic shutdown,
  - c. Inadequate operating procedures with respect to minimizing the effects of a flooding casualty and the loss of reactor power, and (U)
  - d. A deficient air system, susceptible to freeze-up, with low capacity and low blow rate.
2. That there is a danger that, in melding together fact and conjecture, conjecture may be stretched too far and become accepted as fact, thus narrowing the field of search for possible causes of the casualty.
3. That the fact that the court has singled out certain cases for study should not deter others, particularly members of the crews of similar ships, from continuing to study the many questions raised by the THRESHER's loss.
4. That it would be prudent to retain the current interim depth limitation now imposed upon all submarines until each individual submarine's readiness has been reassessed in regard to the factors listed in Opinion 1 above. (U)
5. That a flooding casualty in THRESHER could have resulted from:
  - a. A faulty sil-braze joint.
  - b. Undiscovered shock damage. (U)
  - c. A flexible hose failure.
  - d. A casting or piping failure.
  - e. A minor hull failure.
  - f. Unknowns, including component failure.
6. That loss of reactor power in THRESHER could have resulted from:
  - a. Inadequate protection of electrical switchboards from salt water, particularly from below.
  - b. Location of vital equipments and back-up equipments where a single casualty could inactivate both. (U)
  - c. Other causes.

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7. That submarine operating procedures at the time of the loss of THRESHER were inadequate, in that:

(U)

- a. Cross-connecting of sea water systems was excessively used, particularly at deep submergence.
- b. The concept of securing salt water systems on a flooding casualty and the resulting operating limitations and capabilities had not been appropriately investigated.
- c. The concept of operating main coolant pumps "in slow" with the attendant advantages was not generally appreciated and was not followed on the deep dive of THRESHER.
- d. **b(3) 10 USC 130**
- e. Pre-planned damage control actions and system isolations in order to reduce flooding control reaction time had not been fully explored.
- f. Submarine Force, Atlantic Fleet Instructions did not require and THRESHER agenda for deep dives on 10 April 1963, did not provide for operation of sea valves at various depths to insure proper operation prior to proceeding to test depth for the first time after a protracted overhaul.

8. That THRESHER Class main ballast tank blow system deficiencies were found to be as follows:

(U)

- a. An inadequate blow rate.
- b. An inadequate capacity.
- c. A tendency to freeze up at line restriction points; for example, at the conical strainers in the reducing valves, and
- d. A designed closing of the on-line air bank valves when electric power was lost, followed by a 10-50 second air equalizing delay time before the reserve bank is available on the line.

9. That to provide maximum safety at deep depths (700 feet and greater), all large sea water system hull and stop valves should be hydraulically operable. To provide maximum assurance of operability, sea valves should be operated from a primary station in or near a normally manned area, while hull valves should be operated from a different station, so located that a leak would not prevent access to at least one station.

(U)

10. That a low pressure auxiliary sea water system (low pressure fresh or salt water) would greatly reduce the possibility of flooding at deep depths and should be provided in new construction at an early date. (The great reduction in the length of piping and hoses exposed to sea pressure would

(U)

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eliminate the need for considering many of the solutions proposed hereafter for the currently installed systems. Their consideration is desirable for submarines already built and under construction. A heat exchanger installation is probably the quickest way to provide a low pressure auxiliary sea water system, but other methods should be investigated.)

(U)

11. That the basic auxiliary sea water loop system concept and design for the THRESHER Class is good, and is an improvement over the single header "Christmas tree" systems installed in other nuclear submarines.

12. That operation of the current auxiliary sea water system in the **b(3) 10 USC 130** with remote control from a single operating station, preferably the maneuvering area, would improve overall system reliability and safety, particularly from a system isolation viewpoint; therefore, the Ship's Instruction Book and working plans for the THRESHER Class auxiliary sea water system which call **b(3) 10 USC 130** should be modified at the earliest to require split plant operation as normal mode.

(U)

13. That the constant vent system in the THRESHER Class is a safety hazard.

(U)

14. That constant vents in submarine auxiliary sea water systems need to be closed at deep submergence to increase the safety of the ship; design of components must take this into account.

(U)

15. That there were many reasons for the Bureau of Ships and Portsmouth Naval Shipyard continuing the use of sil-braze joints in piping systems of submarines. These included: years of shipbuilding practice and service, extensive tests, improvement in processes and non-destructive test techniques, the lack of weldable fittings, and the high welded-joint rejection rates in all shipyards.

16. That prior to THRESHER's post shakedown availability, there had been a sufficient number of serious failures of sil-braze piping joints in submarines to require thorough investigation by all responsible for THRESHER's safety. (Fact 111)

(U)

17. That there were indications of high rejection rates of sil-braze joints made in the period 1958-1961 in shipyards other than the Portsmouth Naval Shipyard (Fact 110)

(U)

18. That Portsmouth Naval Shipyard did not aggressively pursue the ultrasonic inspection of sil-braze joints in THRESHER as required by the Bureau of Ships letter of 28 August 1962 (Exhibit 115). Deputy Commander Submarine Force, U.S. Atlantic Fleet did not aggressively pursue the ultrasonic inspection, nor did the Commanding Officer, THRESHER.

(U)

19. That the rejection rate of 13.8% on original sil-braze joints in THRESHER was a clear indicator that additional action was required.

(U)

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20. That the confidence of the Portsmouth Naval Shipyard personnel in sil-braze joints was not fully warranted in the case of the auxiliary sea water, trim and drain, or air conditioning systems in THRESHER because: (U)
- a. Several submarines had suffered casualties which nearly resulted in their loss. Of these, the most pertinent was the U.S.S. Barbel, which suffered a failure of a 5-inch sil-braze joint on 30 November 1960 at an approximate depth of 650 feet. (U)
  - b. BARBEL investigation showed inadequate quality assurance in Portsmouth Naval Shipyard sil-brazing process prior to 1961. (U)
  - c. There had been no extensive retrofit of high quality sil-braze joints under the improved quality developed by Portsmouth Naval Shipyard after THRESHER's initial criticality. (U)
  - d. Portsmouth Naval Shipyard had conducted ultrasonic tests on sil-brazed systems in SKIPJACK, finding about 22.5 per cent of joints not meeting the Bureau of Ships prescribed standards. In this case the Shipyard did not report the results to the Bureau of Ships or to Deputy Commander Submarine Force, U.S. Atlantic Fleet. (U)
  - e. No ultrasonic tests of original sil-braze joints in the auxiliary sea water or trim and drain systems in THRESHER had been conducted prior to the post shakedown availability.
21. That the management of the Portsmouth Naval Shipyard did not exercise good judgment in determining not to unlag pipes in order to continue the directed ultrasonic test surveillance of original sil-braze joints in THRESHER after November 1962. (U)
22. That the Bureau of Ships improvement and corrective actions regarding the sil-braze problem were not applied at the Bureau level, or in the field, with sufficient vigor in that: (U)
- a. The continuing flow of information from the operating forces indicated that poor workmanship or design had resulted in inferior and unsatisfactory applications of the silver braze process; this should have resulted in more detailed investigation of the adequacy of sil-braze in hazardous systems;
  - b. There was insufficient inspection and audit by the Bureau of the shipbuilding and repair activities to insure that specifications were being met; and
  - c. The best tool for determining adequacy of sil-braze, i.e., ultrasonic inspection, was not sufficiently exploited from a coverage or timeliness basis.

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23. That it appears that insofar as submarine shock tests are concerned:

(U)

- a. The instrumentation and inspection techniques and levels of effort utilized to date have not insured that all damage is found in the early intensive investigations of damage.
- b. That more effort and instrumentation is required to insure that all damage has been found.
- c. That we may have reached a point of shock factor intensity, i.e., roughly (b) (1) at which component and system mass interaction with the hull is a more critical consideration than pure hull lethality considerations.
- d. That until the matters mentioned briefly in a, b. and c. above are more fully explored and necessary actions are taken, it would be prudent to:

(1) Limit the shock factors used in shock tests to (b) (1) or less.

(2) Increase considerably the level of action in arranging shock tests to provide intensive planning, calculation of effects, instrumentation and inspection before and after such tests.

24. That in view of the many potential sources of casualties and their serious consequences in high performance submarines, such as THRESHER, there is a need to re-emphasize and improve, where indicated, the quality assurance program in shipbuilding and repair yards.

25. That the quality assurance program of the Portsmouth Naval Shipyard would be improved by appropriate consideration of the following:

- a. Quality Assurance Division should report directly to the Shipyard Commander.
- b. Quality assurance should be engineered and planned, utilizing the statistical approach and should de-emphasize the "inspector" approach.
- c. Quality assurance audits should be forwarded to management on a regular basis.
- d. Quality assurance should record all defects, not just remaining defects (for example, brazers and inspectors reject joints and do not report defects found which are readily correctable. This method does not reveal to management all process deficiencies).
- e. Quality assurance ultrasonic test and welding radiographic test requirements should not depend on initiation of inspection requests by pipefitters and welders, but should be separately initiated by the job order preparing authority to facilitate cross-checking.

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- f. A quality assurance program should be developed for flexible hose installation and checkout.
- g. The Quality Assurance Division does not currently have power to disqualify workers observed to be violating procedures, process controls and normal operating instructions, but must so recommend to the shop supervision involved. It might be advisable to permit quality assurance personnel to temporarily remove qualifications (brazers' cards, etc.) under such circumstances to insure that defective work is not built into submarines during the normal administrative handling time for disqualification action.
- h. Welding quality is under the Welding Engineer and is not completely integrated with the quality assurance program in the same manner as other processes are. It is believed desirable to integrate this effort.
- i. Condition sheets (for defects discovered) should be reviewed, analyzed and summarized by the Quality Assurance Division for presentation to management to insure that process deficiencies are brought to management's attention.

26. That the Portsmouth Naval Shipyard attitude towards, and facilities for, minute particulate matter rejection, in general, are not conducive to delivery of high performance systems of the requisite super-cleanliness. Processes of fabrication, installation and repair of such piping systems require engineering revision and facility preparation and, more importantly, personnel training to provide an adequate basis for super-cleanliness. (This is most important for high pressure air and hydraulic systems, but is applicable for other systems.) (U)

27. That dummy valves used as spacers and valves installed backwards for tests should be so marked (tagged) and should be designated in the ship's system status or "rip out" procedure.

28. That the quality of work performed by Shop 56 (Pipe Shop) at Portsmouth Naval Shipyard has improved since the BARBEL incident, particularly in the sil-braze area and in material identification and control, workmanship and quality assurance.

29. That type commanders should be provided with the capability to evaluate hull surveillance information for each individual submarine. (U)

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30. That an identification and listing program for flexible hoses, as provided by Portsmouth Naval Shipyard for THRESHER, was excellent and should be provided for all submarines. (U)
31. That the pipe joint identification program developed in 1962 by submarine new construction shipyards should be applied to earlier submarines to provide a sound basis for checking joint quality verification (U)
32. That those responsible for Submarine Ship Information Books should insure that they are completed and delivered with the ship. (U)
33. That there is a need at Portsmouth Naval Shipyard for additional detailed written repair procedures, inspection routines and quality assurance audit programs, to: (U)
- a. Insure that repairs to submarines are, in fact, accomplished in accordance with the sound engineering judgment available.
  - b. Insure that management's policy is fully carried out.
  - c. Permit planned audit procedures for quality assurance to provide the high assurance of quality and safety necessary.
  - d. Provide the basis for management information for problem-solving.
34. That a "Ship's System Status" or "rip out" procedure is needed to maintain information on the status of the complicated systems of nuclear submarines and the division of responsibility between the submarine and the Portsmouth Naval Shipyard. (U)
35. That contract designs of submarines determine the basic operational and safety procedures; therefore, it is important that the Bureau of Ships should: (U)
- a. Insure that design personnel are familiar with operational procedures,
  - b. Insure that there is adequate feedback of information on earlier systems from shipbuilding yards and submarine operating personnel.
  - c. Insure that damage control under various casualty conditions is thoroughly considered before the final system parameters are rigidly defined, and
  - d. Insure that design personnel become familiar with each other's problems and goals; in effect, break down the walls which apparently compartment such personnel into small areas of expertise.

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36. That the basic design of THRESHER Class submarines is good, and its implementation resulted in the development of a high performance submarine. There are certain improvements desirable to increase the safety margin, as set forth in the recommendations.
37. That since high performance submarines require full quality assurance and a high degree of uniformity, the Bureau of Ships should require adherence to specifications.
38. That all submarine air system design criteria need to be reviewed for adequacy and safety. Of particular importance are the following: (U)
- a. Air blow rate for main ballast tanks.
  - b. Air bank capacity.
  - c. Effect of depth.
  - d. Air condition as regards:
    - (1) Particulate matter rejection
    - (2) Moisture
  - e. Air system mechanical design for inclusion of and positioning filters, strainers and dehydrators.
  - f. Emergency blow capability.
  - g. Number of allowed pressure reductions in air system.
  - h. Allowable mechanical pressure reduction devices in main ballast tank normal and emergency blows.
  - i. Provision of internal drainage of water from air banks into the pressure hull.
  - j. Emergency de-ballasting by chemical gas generation or other means.
  - k. The fail-closed concept for the three air banks now normally carried on the line in the THRESHER Class is not desirable for safety of the ship at test depth and should be modified to provide fail-on-the-line; i.e., air bank valves open.
39. That the high pressure blow of submarine main ballast tanks needs to be tested under conditions simulating a full blow at test depth. (U)
40. That equipment locations in the THRESHER Class submarines are not so selected as to maximize resistance to damage and to facilitate control after damage; for example:
- a. **b(3) 10 USC 130**

(U)

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- b. That protection from water streams and spray of the <sup>b(3) 1</sup> KW ship's service motor generator sets and their electrical connections in the auxiliary machinery space in the THRESHER Class submarines needs improvement. (U)
41. That electrical switchboards in the auxiliary machinery space and engine room of submarines are not sufficiently protected from water streams or spray, especially from below. (U)
42. That the deficiencies which probably caused THRESHER's loss (Opinion 1) could have been reduced by thorough and imaginative analysis and timely dissemination of all information to be had from the BARBEL and other casualties. (U)
43. That submarine diving trainers do not have sufficient capability for simulation of flooding casualties and resulting damage control action. These trainers are important, both for training of personnel and for development of operating procedures for recovery from many casualty situations. (U)
44. That there is a lack of information regarding operating procedures for submarines under varying casualty situations. (U)
45. That the following is a reasonable rationalization of probable events in THRESHER between 0909-0918.1R on 10 April 1963:

It is recognized that the specific nature of the THRESHER loss cannot be determined by assumptions and computer solutions based on those assumptions. The following analysis is made in an effort to determine the parameters of the unknown factors, such as size of leak, by utilizing known factors and the most probable variants of their interpretation as the inputs for computer solutions. It is impossible, with the information now available, to obtain a more precise determination of what actually happened.

Analysis of all of the facts available led to the conclusion that the location of a flooding casualty which might have initiated the loss of THRESHER was in the engine room.

From the many computer solutions there emerge three which bracket the probable actual situation. (U)

It is known with reasonable certainty that at 0909R the THRESHER was at test depth. At about 0910R a message from THRESHER announced a course change to 090° T from 000° T and gave no indication of any difficulty.

It is known, without much doubt, that at 0911R the main coolant pumps of THRESHER, which had been running in "FAST mode" since the start of the dive, either stopped or were slowed to "SLOW mode" of operation.

If the main coolant pumps stopped, there would have been an automatic reactor shutdown (SCRAM). This would have meant no normal main propulsion power available until after the 7.1 minutes between 0911R and time of collapse depth. There is an Emergency Propulsion Motor which could be run from the battery, but it must be unclutched from main turbine drive and the power available from this source is only sufficient for about 5 knots.

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If, instead of stopping, the main coolant pumps had been shifted to "SLOW mode" and main propulsion therefore kept available, there could have been power for about b(3) knots.

(U)

In Case I of the three computer solutions the assumptions were:

1. At test depth.
2. On main propulsion at about 8 knots, with main coolant pumps in "FAST mode".
3. Power lost at 0911R when pumps stop.
4. Emergency propulsion motor placed on propulsion at 0913R.
5. Blow of main ballast tanks from 0913.6 to 0914.1R.
6. Collapse at 0918.1R.

The ship trajectory curve developed by computer solution of this case showed it to be not highly probable, mainly due to the fact that the ship would have decreased depth only about 100 feet by the time the message was transmitted saying, "Experiencing minor difficulties . . ." etc.

In this case, assuming a reasonably good trim, the size of orifice through which flooding could have occurred (with .8 coefficient of discharge) would have been greater than 2" and nearer 2" than 3".

In Case II the assumptions are:

1. At test depth.
2. On main propulsion at about 8 knots, with main coolant pumps in "FAST mode".
3. On a turn with 20° right rudder and 5° down angle on the boat.
4. At 0910.5R flooding occurs and pumps ordered to "SLOW mode".
5. Full speed and 15° up angle ordered at 0911R.
6. Main propulsion power remained available at least until 0912.5R, at which time a speed of about 14.8 knots would have been reached.
7. Main ballast tank blow initiated at 0909.8R and terminated at 0911.3R.
8. Second main ballast blow began at 0913.6R and ceased at 0914.1R.
9. Collapse at 0918.1R.

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Had the main turbines remained on propulsion much longer than 0912.5R with the main coolant pumps in "SLOW mode" b(3) 10 USC Max. speed), THRESHER could have surfaced with a flooding casualty due to any pipe rupture in the ship except b(3) 10 USC 130

The next smaller pipe size in THRESHER is 6" (IPS). Even a 6" size line rupture would produce excessive trim angle prior to the time of the message which indicated "minor difficulty." Main circulating water line rupture or hull rupture are dismissed as remote possibilities, since the actual hull collapse occurred at 0918.1R and would have occurred much earlier had either of these two casualties occurred, causing the change in power at 0911R.

In Case III the assumptions are:

The same as in Case II, except that both flooding and full speed with a 15° up angle occur 1.5 minutes earlier.

This is the most probable approximation of the sequence of events. The ship trajectory curve developed from a computer run with these assumptions indicates that, just prior to the sending of the "Minor difficulties ..." message at 0913R, depth would have been reduced to about 750 feet, and no trouble would yet have developed in maintaining the ordered 15° up angle.

The air blows postulated in both this case and in Case II are predicated on indications on logograms and on the demonstrated tendency for the strainers in the air reducing valves to ice up and fail in approximately the times indicated in the assumption. Furthermore, the phrase "Am attempting to blow ..." in the 0913R message would not be inconsistent with a 90 second blow which had been interrupted by a frozen reducer at 0911.3R or an electrical failure which would have imposed a denial of main ballast tank blow capability for at least ten to fifty seconds.

Case III indicates a hole of a little more than 4".

From all of these studies, it would appear that the flooding which occurred was through a hull orifice (with coefficient of discharge of .8) larger than 2" but not much larger than 4". The corresponding pipe sizes in THRESHER's piping systems would have been between 2" and 5".

46. That manpower loading by the Shipyard in the last two weeks of THRESHER's post shakedown availability was not excessive.

47. That THRESHER's crew had adequate time for rest immediately prior to departure for sea trials.

48. That the Commanding Officer, SKYLARK, failed fully to inform higher authority of all the information available to him pertinent to the circumstances attending the last transmission received by SKYLARK from THRESHER on 10 April 1963, as it was his duty to do, for an unreasonable length of time; but that this could not conceivably have contributed in any way to the loss of THRESHER and was not materially connected therewith.

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49. That although we may never learn the exact cause of the tragic loss of THRESHER, we do know enough to make it necessary for us to explore in depth the many possible causes, to the end that their correction may reduce the probability of a future submarine loss from the same cause. (U)

Some of the possible causes are in the material and operational fields and have been separately treated. Less tangible and more difficult are the possible causes that fall in the personnel field.

THRESHER was well manned by experienced officers and men. They enjoyed the respect of their contemporaries and had earned it.

Portsmouth Naval Shipyard Management and workers looked upon THRESHER as their finest creation. They were proud of her.

Yet, in conscience, the court must report that there are causes in the personnel field which may well have contributed to the loss of THRESHER, and which deserve earliest attention at the highest level.

During a period of expanding volume of work and greatly increasing technical complication in submarine construction and repair, the court finds that the numbers of specially trained, technically competent officers, in both the Bureau of Ships and in the Portsmouth Naval Shipyard, have been seriously reduced. Some of these have been replaced by civilian engineers, but the workload on the officers remaining continues to increase. This situation is seriously impairing the submarine building and repair programs.

At the Portsmouth Naval Shipyard it is resulting in a reduced level of attention to vital submarine design and operational matters which could affect safety. If the situation continues, Portsmouth Naval Shipyard could well become an unreliable and unsafe activity just at the time when the overhaul of Polaris Fleet Ballistic Missile submarines must begin.

50. That the nuclear submarine program is placing upon the Navy and the nation demands for highly qualified and trained manpower in great numbers. (U)

The Navy has established training programs to provide the officers and men to man and operate our highly complex and advanced new submarines, but urgent steps are required to attract into the submarine program and to hold the high caliber young men necessary for safe operation of our submarine force.

51. That during the overhaul and post shakedown availability periods, the responsibilities of the commanding officers of these increasingly complex submarines have become so extensive as to require a high order of technical backup from the operational chain of command. This backup is presently limited by the lack of adequate numbers of officers experienced in the operation of high speed submarines. (U)

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52. That the evidence does not establish that the deaths of those embarked in THRESHER were caused by the intent, fault, negligence or inefficiency of any person or persons in the naval service or connected therewith.

53. That the substantially contemporaneous transfer of THRESHER's Commanding Officer, Executive Officer, Ship's Superintendent and Assistant Ship's Superintendent in the final portion of her post shakedown availability was not conducive to optimum completion of the work undertaken.

54. That the lessons learned from the inquiry into the loss of THRESHER are of such moment as to require wide dissemination within the Navy.

55. That the findings and opinions of this court point out numerous practices, conditions and standards which were short of those required to insure the thorough overhaul and safe operation of the U.S.S. Thresher. These same shortcomings militate against the safe construction and overhaul of all submarines at the Portsmouth Naval Shipyard and are, in varying degrees, applicable to other submarine construction and repair yards. Vigorous steps should be taken to correct them. (U)

These shortcomings have developed incident to the rapid changes in materials, workmanship and operating conditions of submarines during the last decade and to the accelerated pace of the submarine program. They can be blamed on no individual or individuals, and many would not have come to notice had THRESHER not been lost.

The responsibility for the loss of THRESHER cannot be charged to neglect or dereliction on the part of any individual or group of individuals.



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## RECOMMENDATIONS

1. That the interim depth restrictions now imposed upon all submarines should remain effective until careful consideration, for each individual submarine, is given to the probable factors contributing to the loss of THRESHER, as listed in Opinion 1. (U)
2. That the design of submarine sea water systems be reviewed and new construction be modified as follows:
  - a. Provide a low pressure system for auxiliary sea water service.
  - b. Provide remote hydraulic operation for all sea water system sea and hull valves, with the sea valves operated from a primary station in or near a normally manned area and the hull valves operated from a different station so located that a leak will not prevent access to at least one of the two stations. (U)
  - c. That a loop system be provided wherever practicable, with split loop operation provided as the normal mode of operation.
  - d. That the constant vent sub-system be eliminated.
3. That for THRESHER Class submarines the following be provided:
  - a. Elimination of the constant vent sub-system, with substitution of internal venting by manual means.
  - b. Hydraulic remote operation for hull and stop valves.
  - c. Modifications to the auxiliary sea water system plans and Ship's Information Book to show split loop operation as the normal mode.
  - d. Instructions in the Ship's Information Book for safe operation of the trim and drain system at deep depths, with information on valve opening and closure times.
4. That additional inspection, repair and certification of sil-braze joints for operating submarines be performed to attain an acceptable level of reliability. (U)
5. That in new submarine construction all sil-braze joints in hazardous systems above one inch in inside diameter be ultrasonically tested, certified and documented. (U)
6. That in hazardous piping systems of submarines designed to operate below 500 feet, sil-braze joints of more than two inches in inside diameter be replaced by welded joints when replacement is required. (U)

Unclassified

Unclassified

7. That for new construction submarines, welded piping joints be specified for joints of more than two inches in inside diameter in hazardous systems. (U)

8 That shock tests of nuclear submarines be deferred until such time as the Bureau of Ships has reassessed the following: (U)

- a. The adequacy of instrumentation coverage and capability to insure that all damage is found shortly after the shock tests.
- b. The shock resistance and mass interaction of system components and their associated piping and foundations as compared to hull resistance.

9. That shock factors not exceed approximately (b) (1) when tests are resumed unless the action taken pursuant to Recommendation 8 above indicates it is safe to proceed further. (U)

10. That the quality assurance program at Portsmouth Naval Shipyard be further emphasized and improved in scope along the lines indicated in this court's opinions.

11. That the Bureau of Ships require submarine shipbuilding activities to:

- a. Adhere to specifications, and
- b. Obtain approval of the Bureau of Ships for all waivers where this is not practicable.

12. That the Bureau of Ships increase its audit activity to insure adherence to specifications for submarine building, overhaul and repair.

13. That submarine air system design criteria be reviewed for adequacy and safety and, subsequent to such review, that the air systems be modified. (See Opinion 38) (U)

14. That in THRESHER Class submarines, the air system modifications and tests include: (U)

- a. Elimination of the conical strainers in the Marotta reducing valves.
- b. Test of the air systems for a full air bank blow through the main ballast tanks to insure full blowing.
- c. Tests of the main ballast tank structure to determine its adequacy on a direct (b) (1) psi blow.
- d. Elimination of the (b) (1) psi reducers as soon as the air system and ballast tanks have been proven or altered to be capable of accepting 4500 psi.
- e. Provision of 4500 psi blow of main ballast tanks.

Unclassified

Unclassified

15. That increased emphasis be given to damage control considerations in the selection of locations for vital submarine equipment, and that primary and secondary sources not be located in close proximity to each other. (U)

16. That electrical switchboards of submarines be better protected from salt water. (U)

17. That submarine diving trainers be provided the capability of simulating ship reaction to flooding casualties at deep depth. (U)

18. That studies be undertaken on a high priority basis to develop submarine operating procedures which will maximize recovery possibilities under various damage control situations. The following are merely a few examples of the many circumstances which might obtain and which should be explored: (U)

b(3) 10 USC 130

19. That separate and distinct submarine operating procedures be established to govern operations under various situations of depth and speed, to include the following: (U)

- a. High speed maneuvering and transit. Under this situation the submarine would operate in a depth zone which provides adequate security from cavitation, yet reserves a margin for recovery in the event of a control casualty.
- b. Deep depth operations. Under this situation of excursion to extreme depths, an exceptional degree of damage control readiness should be established. Measures for nuclear submarines should include:
  - (1) Use of a moderate speed which is a compromise between protection against a control casualty and protection against a flooding casualty.
  - (2) Use of slightly positive buoyancy trim. ✓
  - (3) Operation of main coolant pumps in "slow mode." ✓  
Similarly, all systems should be in that mode of ✓

Unclassified

Unclassified

operation or alignment which contributes most toward dependable operation under casualty conditions and which minimizes flooding effects.

- (4) Additional manning of interior communications systems and specific detail of personnel to key isolation valves.

20. That early consideration be given to the establishment of an organization, similar to that employed in Naval Aviation, in the interest of safe submarine operating procedures. Such an organization should be responsible for the analysis of events and developments which pertain to submarine safety and the timely dissemination of such information.

BERNARD L. AUSTIN  
Vice Admiral, U. S. Navy  
President

LAWRENCE R. DASPIT  
Rear Admiral, U. S. Navy  
Member

WILLIAM C. HUSHING  
Captain, U. S. Navy  
Member

JAMES B. OSBORN  
Captain, U. S. Navy  
Member

NORMAN C. NASH  
Captain, U. S. Navy  
Member

BERNARD L. AUSTIN  
Vice Admiral, U. S. Navy  
President

SAUL KATZ  
Captain, U. S. Navy  
Counsel for the court

Unclassified

Unclassified

VOLUME VII OF 12 VOLUMES

RECORD OF PROCEEDINGS

of a

COURT OF INQUIRY

convened at

U. S. Naval Submarine Base New London  
Groton, Connecticut

and

Portsmouth Naval Shipyard  
Portsmouth, New Hampshire

by order of

Commander in Chief  
U. S. ATLANTIC FLEET

To inquire into the circumstances  
of the loss at sea of

USS THRESHER (SS(N)593)

which occurred on

10 April 1963

Ordered on 10 April 1963

Exhibits 1 to 50

Unclassified

Unclassified

-A- PRIORITY//ROUTINE

RECEIVED

GND027MADJ  
 PP RUEGIC  
 DE RUEGMA JJ  
 P R 051829Z  
 FM CONSUBLANT ADMIN PTS NH  
 TO ZEN/USS THRESHER  
 INFO CNO  
 CINCLANTFLT  
 COMEASTSEAFLON  
 COMONE  
 CONSUBLANT  
 DEPCONSUBLANT  
 ZEN/NAVSHIPYD PTS NH  
 CONSUBFLOT TWO - - - - COPY #11  
 COMSUBDEVCRU TWO - - - - COPY #12  
 COMSUBRON TEN - - - - COPY #13  
 ZEN/USS SKYLARK  
 BT

Unclassified

- A. CONSUBFLOT TWO OPSKED 14-63
- B. CONSUBLANT INST P-5403.4
- C. CONSUBLANT OPOD 1-61
- D. CONSUBFLOT TWO OPOD 1-62
- E. COMNAVSHIPYD PTS NH 051313Z NOTAL
- F. COMFAIRDET BRUNSWICK 051505Z NOTAL
- G. COMNAV BSN 051424Z NOTAL
- H. CONSUBLANT NOTICE 03121 OF 13 JUL 62
- I. THIS IS CSLAP OPOD 2-63
- J. WHEN RFS ABOUT 9 APR PROCEED TO BSN OPAREA AND RBVU WITH USS SKYLARK IAW REF A.
- K. CONDUCT OPS IAW REF A THRU D.
- L. AREAS ASSIGNED IAW REF E THRU G.
- M. COMMUNICATIONS IAW REF A, C AND D.
- N. MAKE OWN MOVREP.
- O. MAKE CHECK REPORTS IAW REF B AND H.
- P. UPON COMPLETION OF OPS REQUIRED BY REF B DETACH SKYLARK AND PROCEED DIR PORTSMOUTH TO ARR 11 APR.

BT  
05/2034Z

WU/EP  
IN-24

REF 051313Z: UNCLAS. OPAREA ASSIGNMENT A. CESS  
 P 0120.5 1. USS THRESHER ASG BSN OPAREA ONE ON 9  
 APR AND 11 APR 24 HR...ETC...ACT 21...

REF 051505Z: NOT HELD

REF 051424Z: NOT HELD

ACTION 211 \_\_\_\_\_

3644

129

Office (Original Copy)

0000  
Being sent to local papers Will save

LTJG Ronald C. BABCOCK (b) (6)

Portsmouth, N. H.  
(b) (6)

P  
P

LCDR Michael J. DI NOLA (b) (6)

(b) (6) Rye, N.H.

~~EX~~ LCDR Pat M. GARNER (b) (6)

Mystic, Conn.

N

LTJG John G. GRAFTON (b) (6)

Dewitt, N. Y.

N

LCDR John W. HARVEY (b) (6)

London, Conn. (b) (6) New

N

LTJG James J. HENRY, Jr. (b) (6)

(b) (6) Brooklyn 4,  
N. Y. (b) (6)

N

LCDR John S. LYMAN, Jr. (b) (6)

Kittery, Maine

P

LTJG Frank J. MALINSKI (b) (6)

Phoenix, Ariz.

N

~~LT Raymond A. MC COOLE (b) (6)~~

~~Dover, N.H.~~

IP

LTJG Guy C. PARSONS, Jr. (b) (6)

(b) (6) White  
Plains, N.H. (b) (6)

P

LT John SMARZ, Jr. (b) (6)

Portsmouth, N. H.

P

LTJG John J. WILEY (b) (6)

Kittery, Maine

P

~~EX~~ LT Merrill F. COLLIER (b) (6)

Gales Ferry, Conn.  
(b) (6)

N

ARSENAULT, Tilmon J. ENC(A)(SS) (b) (6)

Portsmouth, N. H. (b) (6)

BAIN, Ronald E. EN2(SS)-P2 (b) (6)

Mt. Vernon, Ill.

N

Photo

BELL. John E., MM1-P2, USN (b) (6)  
(b) (6) Mystic, Conn. (b) (6)

N

BOBBITT. Edgar S., EM2(SS), USN (b) (6)  
(b) (6) Midland, Texas. (b) (6)

N

OK BOSTER. Gerald C., EM3(SS), USN - (b) (6)  
(b) (6) St. Louis, Missouri. (b) (6)

N

OK BRACEY. George (n), SD3(SS), USN (b) (6)  
(b) (6) Groton, Conn. (b) (6)

N

BRANN. Richard P., EN2(SS), USN (b) (6)  
(b) (6) Somersworth, N.H. (b) (6)

P

CARKOSKI. Richard J., EN2(SS), USN (b) (6)  
(b) (6) Grand Island, Nebr. (b) (6)

N

CARMODY. Partick Wayne, Sk2, USN - (b) (6)  
(b) (6) Toledo, Ohio - No phone listed.

N

OK CAYEY. Steven G., TM2(SS), USN, (b) (6)  
(b) (6) Norwich, Conn. (b) (6)

N

OK CHRISTIANSEN. Edward (n), Sn(SS), USN - (b) (6)  
(b) (6) Bronx 63, New York, N.Y. (b) (6)

N

CHRISTENSEN. Larry W., EM2(SS), USN, (b) (6)  
(b) (6) Topeka, Kansas. (b) (6)

N

CLEMENTS. Thomas E., ETR3(SS), USN, (b) (6)  
(b) (6) Westfield, N. J. (b) (6)

N

2



*Walter Hill*  
*11/11/51*  
*?*

CUMMINGS. Francis Michael, SOS2(SS), (b) (6)  
(b) (6)

DABRUZZI. Samuel Joseph, ETN2(SS), (b) (6)  
Maine, (b) (6)

Kittery, P

DAVISON, Clyde Elcott, III, ETR3, (b) (6)  
Hobbs, New Mexico (b) (6)

N

DAY. Donald Clifford, EN3, (b) (6)  
(b) (6)

Newberryport, Mass. P

DENNY, Roy Overton, Jr., EM1(SS), (b) (6)  
Maine, (b) (6)

Kittery, P

~~DE STEFANO, Frank Joseph, Jr. MMCA, (b) (6)~~  
~~Hartford, Conn., (b) (6)~~

N

DI BELLA. Peter Joseph, SN, (b) (6)  
(b) (6)

Portsmouth, N.H. P

DUNDAS. Don Roy, ETN2(SS), (b) (6)  
(b) (6)

Russel, Kansas N

OK DYER, Troy Earl, ET1(SS), (b) (6)  
(b) (6)

Groton, Conn. N

FORNI. Ellwood Henry, SOCA(SS), (b) (6)  
(b) (6)

Mystic, Conn. N

FOTI, Raymond Peter, ET1(SS), (b) (6)  
Hampton, N.H., (b) (6)

P

FREEMAN, Larry Wavne, FTM2(SS), (b) (6)  
Maine, (b) (6)

Kitter, P

FUSCO, Gregory J. EM2(SS)-P2  
(b) (6)

Kittery, Me. (b) (6)

P

GALLANT, Andrew Joseph Jr.  
(b) (6)

McKinley, Maine (b) (6)

D

GARCIA, Napoleon T. SD1(SS)  
(b) (6)

Washington 20, D.C.  
(b) (6)

N

GARNER, John E.. YNSN(SS)  
(b) (6)

Vallejo, California  
(b) (6)

H

OK GAYNOR, Robert W. EN2(SS)  
(b) (6)

Groton, Conn.  
(b) (6)

N

GOSNELL, Robert H., SA(SG)  
(b) (6)

Raleigh, N.C. (b) (6)

N

OK GRAHAM, William E. SOC(SS)  
(b) (6)

North Stonington, Conn.  
(b) (6)

N

GUNTER, Aaron J... QM1(SS)  
(b) (6)

Portsmouth, N.H. (b) (6)

P

HALL, Richard C. ETR2(SS)-P2  
(b) (6)

Arlington, Va.  
(b) (6)

N

HAYES, Norman T. EM1-P2  
(b) (6)

Temple City, Calif.  
(b) (6)

N

HEISER, Laird Glenn. MM1-P2:  
(b) (6)

Topen, Pa. (b) (6)

(b) (6)

N

HELSIUS, Marvin Theodore, MM2  
(b) (6)

Trout Creek, Michigan  
(b) (6)

N

HEWITT, Leonard Hogentogler. EMCA(SS)-P2  
(b) (6) Kittery, Me. (b) (6)

P

HOAGIE, Joseph Harshorne, TM2(SS)  
(b) (6) Hampton, N.H. (b) (6)

P

Q

HODGE, James P., EM2, USN, (b) (6)  
Tarrant City, Ala., (b) (6)

OK HUDSON, John F., EN2(SS), USN, (b) (6)  
Groton, Conn. (b) (6)

INGLIS, John P., FN, USNR, (b) (6)  
Spokane 53, Wash. (b) (6)

OK JOHNSON, Brawner G., FTF1(SS), USN, (b) (6)  
Groton, Conn. (b) (6)

JOHNSON, Edward A., ENCA(SS), USN, (b) (6)  
Maine.

JOHNSON, Richard L., RMSA, USN, (b) (6)  
Minn.

JOHNSON, Robert E., TMC(SS), USN, (b) (6)  
(b) (6) Kittery, Maine. (b) (6)

JOHNSON, Thomas B., ET1(SS), USN, (b) (6)  
Montoursville, Pa., (b) (6)

JONES, Richard W., EM2(SS), USN, (b) (6)  
Milford, N. H. (b) (6)

KALUZA, Edmund J., Jr., SOS2(SS), USN, (b) (6)  
Willimanset, Mass. (b) (6)

KANTZ, Thomas C., ETR2(SS), USN, (b) (6)  
An Arbor, Michigan. (b) (6)

KEARNEY, Robert D., MM3, USN, (b) (6)  
Denville, New Jersey. (b) (6)

KEILER, Ronald D., IC2(SS), USN, (b) (6)  
Green Bay, Wisc., (b) (6)

KIESECKER, George J., MM2(SS), USN, (b) (6)  
Exeter, N. H. (b) (6)

KLIER, Billy M., EN1(SS), USN, (b) (6)  
Conn. (b) (6)

OK KRONER, George Ronald, CS3, USN, (b) (6)  
Cleveland, Ohio (b) (6)

LANQUETTE, Norman G., QM1(SS), USN, (b) (6)  
(b) (6) Rahway, N. J. (b) (6)

LAVOIE, Wayne W., YN1(SS), USN, (b) (6)  
N. H. (b) (6)

MABRY, Templeman N., Jr., EN2(SS), USN, (b) (6)  
(b) (6) Albuquerque, New Mexico (b) (6)

MANN, Richard H., Jr., IC2(SS), USN, (b) (6)  
(b) (6) North Hampton, N. H. (b) (6)

Handwritten notes on the right margin, including the word "Note" at the top and a vertical list of letters: N, N, W, N, North Jay, Hendricks, P, N, P, P, N, N, N, P, Groton, N, N, Gonic, N, O, E.

James P. Ritchie, RM2

(b) (6)

Burlington, Vermont

(b) (6)

Pervis (n) ROBISON, SN

(b) (6)

Nutley, New Jersey

(b) (6)

Glenn A. ROUNTREE, QM2(SS)

(b) (6)

Portsmouth, N. H.

(b) (6)

Anthony A. RUSHETSKI, ETN2

(b) (6)

Allentown, Penn.

James M. Schiewe

(b) (6)

Bristol, Conn.

(b) (6)

Benjamin N. Shafer, EMCM(SS)

(b) (6)

Gales Ferry, Conn.

(b) (6)

John D. Shafer, EMCS(SS)

(b) (6)

Groton, Conn.

(b) (6)

P  
N ✓  
P  
N ✓  
N ✓  
N ✓

(b) (6)

MC CLELLAND, Douglas R., EM2 - (b) (6)  
Portsmouth, N.H., (b) (6)

MC CORD, Donald J., MM1 - (b) (6)  
(b) (6)

Exeter, N.H., (b) (6)

MC DONOUGH, Karl P., TM3 - (b) (6)  
New Jersey, (b) (6)

Titusville,

MIDDLETON, Sidney L., MM1 - (b) (6)  
(b) (6)

Groton, Connecticut, (b) (6)

P  
P  
P  
N  
N

MARULLO, Julius F., Jr. CM1(SS), USN, (b) (6)  
(b) (6) Groton, Conn. (b) (6)

Exhibit (2)  
8

⑧

Ronald A. MUISE, CS2

(b) (6)

Los Angeles 27, Calif. *N*

James A. MUSSELWHITE, ETN2(SS)

(b) (6)  
(b) (6)

Kittery, Maine *P*

Donald E. NAULT, CS1(SS)

(b) (6)  
(b) (6)  
(b) (6)

Groton, Conn. *N*

Walter Jack NOONIS, EMC(SS)

(b) (6)  
(b) (6)

Portsmouth, N. H. *P*

John D. NORRIS, ET1(SS)

(b) (6)  
(b) (6)

Groton, Conn. *N*

Chesley C. OETTING, EM2-P2

(b) (6)

Mankato, Minnesota (b) (6) *N*

Roscoe C. PENNINGTON, EMCA(SS)

(b) (6)

Groton, Conn. *N*

(b) (6)

James G. Peters, EMCS

(b) (6)

Kittery, Maine *P*

(b) (6)

James F. PHILLIPPI, SOS2(SS)

(b) (6)

Yucaipa, California *N*

(b) (6)

Dan A. Philput, EN2(SS)P2

(b) (6)

Dover, New Hampshire *P*

(b) (6)

Richard (n) PODWELL, MM2-P2

(b) (6)

Exeter, N. H. *P*

(b) (6)

John S. REGAN, MM1(SS)-P2

(b) (6)

Groton, Conn. *N* 9

SHIMKO, Joseph T., MM1-P2 - (b) (6)	New Market, Ala.	N
SHOTWELL, Burnett M., ETRSN - (b) (6) N. J., (b) (6)	Red Bank,	N
SINNETT, Alan D., FTG2 - (b) (6) (b) (6)	Groton, Conn.	N -
SMITH, William H. Jr., BT1 - (b) (6) (b) (6)	Roselle Pk, N. J.	N
SNIDER, James L., HM1 - (b) (6)	Uncasville, Conn. (b) (6)	N -
SOLOMON, Ronald H., EM1 - (b) (6) N. H., (b) (6)	Exeter,	P
STEINEL, Robert E., SO1 - (b) (6) Mass., (b) (6)	Salisbury Beach,	P
VAN PELT, Roger E., IC1 - (b) (6) Kittery, Maine, (b) (6)		P
WASEL, David A., RMSN - (b) (6) (b) (6)	New Britain, Conn.	N -
WALSKI, Joseph A., RM1 - (b) (6) (b) (6)	Hampton, N. H.,	P
WIGGINS, Charles L., FTG1 - (b) (6) N. H., (b) (6)	Exeter,	P
WISE, Donald E., MMCA - (b) (6) (b) (6)	Arlington, Mass.,	P
WOLFE, Ronald E., QMSN - (b) (6) (b) (6)	Jewett City, Conn.,	N
ZWIRTEL, Jay H., EM2 - (b) (6) (b) (6)	LaCrosse, Wisconsin.,	N -

10



SS PRESHE (SS(N,59)) SAILING LIST

PERSONNEL & CLEARANCE

TEL. NO.

NEXT OF KIN

DESIGN DIVISION

ALLEN, LCDR Philip H.

(b) (6)

Code 241D

(b) (6)

North Hampton, N.H.

(b) (6)

*PRESOTT, Robert D. (on Board)*

~~PRESOTT, Robert D.~~

(b) (6)

(b) (6)

Sanford, Me. (b) (6)

~~Code 246~~

SHARON, Robert E.

(b) (6)

Code 246

(b) (6)

Newburyport, Mass. (b) (6)

GUY, Paul A.

(b) (6)

Code 261

(b) (6)

(b) (6) Portsmouth, N. H.

FISHER, Richard K.

(b) (6)

Code 246

(b) (6)

Durham, N. H. (b) (6)

PLANNING & ESTIMATING DIVISION

BILLINGS, LCDR John H.

(b) (6)

Code 213

(b) (6)

South Berwick, Me. (b) (6)

COMBAT SYSTEMS DIVISION

WHITTEN, Lawrence E.

(b) (6)

(b) (6)

(b) (6) Northwood, N. H.

(b) (6)

COMBAT SYSTEMS DIVISION (Cont'd)

SEAL, Daniel W., Jr.  
(b) (6)

(b) (6)

Somersworth, N. H. (b) (6)

DES JARDINS, Richard R.  
(b) (6)

(b) (6)

(b) (6) Kittery, Ma.

SPERRY REPRESENTATIVE

K. R. CORCORAN  
(b) (6)

(b) (6)

Charlottesville, Virginia (b) (6)

COMBAT SYSTEMS DIV. CONTRACTORS

JAQUAY, MAURICE F.  
(b) (6)  
Raytheon Representative  
(b) (6)

(b) (6)

MAURICE JAQUAY, WIFE

Middletown, R. I.

KEUSTER, D.  
Sperry Representative

(b) (6)

W. Hyattsville, Md.

STADTMULLER, D.  
Sperry Representative

(b) (6)

Flower Hill, Roslyn, N. Y.

PRODUCTION DEPARTMENT

BIDDERMAN, LT Robert D.  
(b) (6)  
Code 313

(b) (6)

Hampton, N. H. (b) (6)

CRITCHLEY, Kenneth J.  
(b) (6)

(b) (6)

(b) (6)  
Biddaford, Ma. (b) (6)  
(b) (6)

Code 340A

PERSONNEL & CLEARANCE

TEL. NO.

NEXT OF KIN

CURRIER, Paul C.  
(b) (6)

(b) (6)

Exeter, N. H.

ABRAMS, Fred P.  
(b) (6)

(b) (6)

Ritbury, Ma. (b) (6)

PALMER, Franklin J.  
(b) (6)

(b) (6)

(b) (6)

Durham, N.H.

DINEEN, George J.  
(b) (6)

(b) (6)

Biddeford, Me.

(b) (6)

MOREAU, Henry  
(b) (6)

(b) (6)

PORTSMOUTH, N.H.

LCDR ROBT. L. KRAG  
(b) (6)

DEP CONSULTANT

(b) (6)

New Bedford, Conn

ZGZCQXD012  
RR RUCKDR RUEGXC RUEGNA RUEGTDG RUEGXG  
DE RUEGXG 812  
RUEGXG ZFRI USS SKYLARK  
RUEGNA T USS THRESHER  
ZNR

R 051942Z  
FM COMSUBFLOT TWO  
TO USS SKYLARK  
INFO COMSUBLANT  
DEPCOMSUBLANT  
COMSUBLANT ADMIN PTGMH  
USS THRESHER  
COMSUBDEVGRU TWO  
COMSUBRON TEN

BT  
UNCLAS  
SKYLARK WEEKLY EMPLOYMENT

A. BY OPSKED 14-63

1. CHANGE REF A TO READ AS FOL:

WHEN RFS 2 APR SKYLARK PROCEED BSN OPAREA I BRAVO TO RDVU WITH  
THRESHER IN POSIT 42-55N 70-25W AT 091600Z. UPON COMPL OPS IN BSN OPAREAS  
AND WHEN DIRECTED BY OTC PROCEED TO POSIT (b)(1) 10 APR AT  
101200Z FOR OPS AS DIR BY OTC. WHEN RELEASED BY OTC PROCEED DIR TO WLOM  
TO ARR 11 APR.

2. OTC IS THRESHER. COMM 0158 PRI, 0258L SEC. MAKE OWN UNCLAS MOVREP

BT

(b)(1)

05/1941Z

NNNN

291600Z 11  
291700Z 12  
101200 07

Exhibit (3)

USS THRESHER (SSN 593)  
7 Floor Post Office  
New York, New York

2 April 1963

USS THRESHER NOTICE 9080

From: Commanding Officer, USS THRESHER (SSN 593)  
To: Distribution

Subj: Sea Trial Agenda

Ref: (a) Shipboard Test Memorandum SSN593-S08 01 050  
(b) Shipboard Test Memorandum SSN593-S08 01 049  
(c) Shipboard Test Memorandum SSN593-S08 01 048  
(d) Shipboard Test Memorandum SSN593-S08 01 012  
(e) SSN 593 Record of Builders Sea Trials

Encl: (1) Sea Trial Agenda

1. Purpose. To promulgate the ship's Sea Trial Agenda.

2. Information.

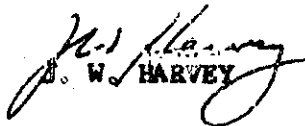
a. Enclosure (1) lists the items to be completed during Sea Trials and provides sequencing as necessary to prevent conflicts between trials.

b. Reference (e) contains information on the requirements for satisfactory completion of Builder's Trials and provides a source of comparative data for the present Sea Trial agenda.

3. Coordination. The Executive Officer is appointed Sea Trial Coordinator.

4. Action. Sea Trials will be conducted in accordance with enclosure (1). Department Heads will inform the Sea Trial Coordinator when each test is satisfactorily completed; or if unable to complete a test; or if during the trials it becomes evident that a test must be repeated, rescheduled, or changed in sequence. During Sea Trials the Coordinator will maintain the ship's master record of the agenda. Events 37, 50, 51, 60, 61, and 64 will be conducted in accordance with references (a) through (d).

5. Cancellation. This notice is cancelled upon completion of Sea Trials and for record purposes on 30 April 1963.

  
J. W. HARVEY

Distribution:  
List I (less Code J)  
All Officers  
All Chief Petty Officers

Copy to:  
List III (Code B only)  
COMPTSMENA VSHIPYD (6)  
COMSUBDEVGRU TWO

Exhibit (4) 6 pages  
1

Sea Trial Schedule

Event #	Key Ev.	Event	Time (in hrs. after u/v)	PHASE
1.		Rig for dive	0-3	
2.		Test operation of fathometer	0-3	
3.		Test all radio xmtrs, rcvrs, & electronic equipment	0-3	
4.		Test operation of radar	0-3	
5.		Test operation of ECM & IFF	0-3	
6.		Test accuracy of all bearing transmitters & indicators	0-3	
7.		Check radar & sonar bearings against visual bearings	0-3	
8.		Test DRAI, DRT, & MK19 plotter	0-3	
9.		Test EM log using navigational fixes to determine accuracy	0-3	
10.		Test fairwater & stern planes	0-3	
11.		Compare loran A fix against visual fix	0-3	
12.		Load variable tanks to computed compensation	0-3	
13.		Test all sonar equipment. Establish UQC communication with escort	0-3	
14.		Compare SINS against visual fix for accuracy	0-3	
15.		Build up to flank speed long enough to allow temperatures to stabilize	1-1½	
16.		Build up turns to back emergency	1½-2	
17.		Emergency reversal ahead flank to back emergency	2-2½	

Enclosure (1) to THRESHER NOTICE 9080

Exhibit (4)  
2

Sea Trials Schedule (Cont'd)

Event #	Key Ev.	Event	Time (in hrs. after u/v)	Phase
18.		Quick reversal from maximum speed astern to ahead flank	2½-2¾	↑ Enroute initial dive area ↓
19.		Inspect shaft seal for leakage and adequate circ. water	0-3	
20.		Record magger readings for all antennas	0-3	
21.		Test SPM	2½-3	↑ Initial dive ↓
22.		Test GDU	2½-3	
23.	*	Station personnel in all compartments man phones, report leaks	3-4	
24.		Submerge to periscope depth	3-4	
25.		Obtain 1/3 trim	3-4	
26.		Operate all masts; check for leakage, check periscope optics	3-4	
27.		Vent fuel system	3-4	
28.		Check out UQC & BQC with escort	3-4	
29.	*	Surface	3 3/4-4	
30.	*	Submerge to periscope depth, then 100 ft, then periscope depth	4-5½	
31.		Fire water slugs from all torpedo tubes	4-5½	↑ Second dive ↓
32.		Test operation of all sonar equipment	4-5½	
33.		Pump all bilges	4-5½	
34.		Test operation of hand valve	4-5½	
35.		Snorkel	4-5½	
36.		Ventilate	4-5½	

-2- Enclosure (1) to TRANSFER NOTICE 9000

Exhibit (4)

Sea Trials Schedule (Cont'd)





<u>Event #</u>	<u>Key Ev.</u>	<u>Event</u>	<u>Time (in hrs. after u/w)</u>	<u>Phase</u>	
37.		Operate GDU (T/M S08-01-048)	4-5½	↑ Second Dive ↓	
38.		Conduct firing test of signal ejectors	4-5½		
39.	*	Surface	5½-5¾		
40.	*	1½ hour full power run	5¾-7	Enroute on surface to deep dive area	
41.	*	Submerge	7-7 1/4	↑ Enroute submerged to deep dive area ↓	
42.		Operate 8000 GPD for 24 hours	7-31		
43.		Operate 2000 GPD for 12 hours	7-19		
44.	*	4 hour full power run	14-18		
45.		Shift propulsion modes	9-9½		
46.		Demonstrate various combinations of steering & diving planes control	9½-10		
47.		Exercise torpedo tubes at full power submerged	14-18		
48.		Demonstrate the degree of sonar interference at all ship's speeds	7-23		
49.		Test SPM (at 100ft)	10-10½		
50.	*	Test floating wire antenna (S08-01-049)	10½-11		
51.	*	Test torpedo tubes (S08-01-050 par.4.D)	11-13		
52.	*	Station personnel in all compts. man phones, check for leaks, establish UQC communications with escort.	23-25		
53.	*	Submerge to test depth	23-25		Initial deep dive
54.		Return to periscope depth	24 3/4-25		↓

-3- Enclosure (1) to THRESHER NOTICE 9080

Exhibit (4)








Sea Trials Schedule (Cont'd)

Event #	Key Ev.	Event	Time (in hrs. after u/w)	Phase
55.		Test operation of all masts	25-25½	 Initial deep dive
56.	*	Surface	25½-25½	
57.		Check operation of all equipments which could have been flooded by test depth pressure	25½-27	
Items which could have been flooded by test depth pressure:				
a. All running lights. b. BQH-1. c. Sonars. d. Megger antennas immediately upon surfacing and again after ½ hour. Compare with readings taken before initial dive. e. Check periscope optics. f. Test ECM, Radar, IFF. g. Test head valve. h. Test searchlight. i. Test suitcase. j. Test JA Circuit.				
57A.		Megger 13 DTMB hydrophones (send msg to PMSY Code 246A, if any are flooded).	25½-27	
58.	*	Submerge to test depth	27-33	
59.		Cycle main vents	27-33	 Second deep dive
60.	*	Operate GDU (T/M S08-01-048)	27-33	
61.	*	Test torpedo tubes (S08-01-050, para 4.2, 4.3 & 4.4)	27-33	
62.		Operate all bulkhead flappers & w/t doors	27-33	
63.		Operate MSW & ASW valves. Operate all sea valves at 1/2 test depth and at test depth	27-33	
64.	*	Hull compressibility factor test (08-01-012)	27-33	

-4- Enclosure (1) to THRESHER NOTICE 9080

Exhibit <sup>4</sup>(5)  
5

Sea Trials Schedule (Cont.)

<u>Event #</u>	<u>Key Ev.</u>	<u>Event</u>	<u>Time (in hrs. after u/w)</u>	<u>Phase</u>
65.		Cycle CD-29	27-33	 Second deep dive
66.		Operate H.P. brine pump	27-33	
67.		Operate N.L.M. & C.I.	27-33	
68.		Steep angle operation (8000 GPD & L.O. purifiers in particular)	33-35	
69.		Conduct full throws of rudder & planes in normal & emergency mode at flank speed	33-35	 
70.		Test AMC	33-35	
71.	*	Submerged transit to PNSY (no tests scheduled)	35-53	 Surfaced & submerged transit to PNSY 
72.	*	Surface, transit to 2XR	53-55	
73.	*	Do anchor test after surfacing	55-56	
74.	*	Enter port, end of sea trials	56-57	

-9 APR 1983 09 15

BR0025  
SHADES  
PP RUEGXD  
DE RUEGHA 88  
ZNR  
P 091417Z  
FM NABG  
TO OLCX  
INFO YASL  
ZEN/SPIU  
GR11

THREEMER  
CSFZ  
CSOS 2  
COMUSLANT ADMIN PTENTH

CSRETC NEON  
"CHECK REPORT"  
NEXT REPORT DUE 100917Z  
LOCAL TIME

BT  
UNCLAS.  
DEPARTING BUSY 2HR, PORTSMOUTH, ENROUTE BOSTON OPARIA.  
CHECK TWO FOUR  
BT  
09/1429Z

Unclassified

EXHIBIT (6)

10 APR 1963 13 04

DXD028  
SKC041  
OO RUEGXD  
DE RUEGXC 022  
ZNR  
O 101604Z  
FM NJOF  
TO OLDK  
INFO SPIU  
BIKN  
GR47  
BT

SKYLARK  
CSF2  
CSL ADMIN PTSMH  
CSS10

UNCLAS  
UNABLE TO COMMUNICATE WITH RHRESHER SINCE 0917R. HAVE BEEN  
CALLING BY UQC VOICE AND CW QRB CW EVERY MINUTE EXPLOSIVE  
SIGNALS EVERY 10 MINS WITH NO SUCCESS. LAT TRANSMISSION RECD  
WAS GARBLED. INDICATED THRESHER WAS APPROACHING TEST DEPTH.  
MY PRESENT POSITION (b)(1) CONDUCTING EXPANDING SEARCH  
BT  
13/1746Z

NNNN

Exhibit (7)

10 APR 1963 14 47

ZCZCDXD025

OO RUCKDR

DE RUEGXD 025

ZNR

O 101940Z

FM OLDK

INFO YZZF

CSF2

CSL

O 101857Z

FM OLDK

TO NJOF

BT

UNCLAS

REQUEST FOLLOWING

- A. INITIAL POINT OF DIVE
- B. INITIAL COURSE AND SPEED OF THRESHER
- C. POSITION LAST CONTACT
- D. EXPECTED TIME OF COMPLETION OF DIVE
- E. DEPTH OF WATER BY SOUNDING

B

T

10/1858Z

Exhibit (8)

ZCZCOKD#30  
OO RUCXDR  
DE RUEGKD #30  
ENR  
OO 182109Z  
FM OLCX  
INFO YZZF

CSF2  
CONSUBLANT

O 182815Z  
FM NJOP  
TO OLCX  
BT

SKYLARK  
CSF2

UNCLAS

YOUR 181857Z

A. INITIAL POSIT OF DIVE (b)(1)

AT 091922Z

B. INITIAL COURSE AND SPEED. FROM INITIAL POSIT OF DIVE PROCEEDING TO  
(b)(1) AT 16 KTS.

C. POSITION OF LAST CONTACT AT 181245Z RECEIVED FROM THRESHER. HOLD  
YOU BRG 147 3400 YARDS. SKYLARK POSIT 181245Z (b)(1)

MAINTAINED VOICE HSC CONTACT UNTIL 181417Z. SKYLARK POSIT AT  
181417Z (b)(1)

D. EXPECTED TIME OF COMPLETION OF DIVE. UNKNOWN

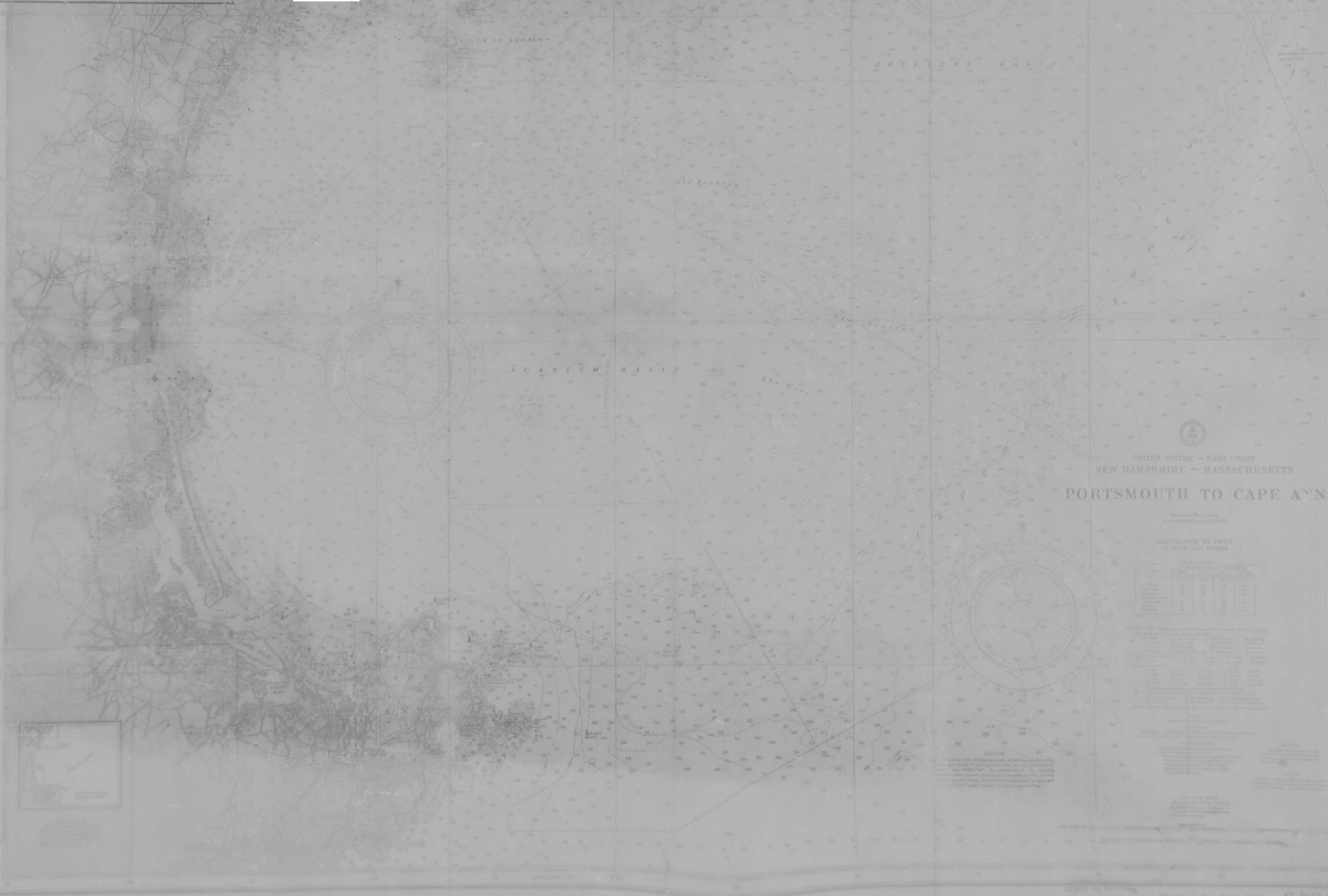
E. DEPTH OF WATER 1380 FATH. SEA STATE ONE

BT

18/2114Z

NNNN

10



UNITED STATES - EAST COAST  
NEW HAMPSHIRE - MASSACHUSETTS  
**PORTSMOUTH TO CAPE ANN**

Minimum Depth  
from Lowest of Low Water

SOUNDINGS IN FEET  
AT SEVEN LOW WATER

Depth	Symbol
100	100
90	90
80	80
70	70
60	60
50	50
40	40
30	30
20	20
10	10
5	5
1	1
0	0

Chart No. 1182 W  
Scale 1:50,000  
Published 1954  
Revised 1954

CAUTION  
This chart is a reproduction of the original chart published by the Hydrographic Office, U.S. Navy, and is not to be used for navigation without the original chart.



Exhibit 10



DAD439  
SK0870  
OO RUEBXD  
OO RUEGXO 043  
LNR  
O 132245Z  
FM NJOP  
TO YZZF  
OJDK  
BT

SKYLARK  
CSL  
CSF 2

UNCLAS  
SITREP SEVEN  
RECOVERY AND SKYLARK IN CENTER OF HEAVY OIL SLICK  
DURING TO RECOVERY HAS RECOVERED PIECES OF CORN  
AND PLASTIC BELIEVED TO BE HULL INSULATION  
BT  
13/2009Z

NNNN

NNNDK004  
JXC009  
OO RUEGAD  
DE RUEGAC 253  
ZNR

O 182315Z

FM NJOP

TO YZZF

OLDX

BT

UNCLAS

SITREP EIGHT

NO CHANGE FROM SITREP SEVEN

OIL SLICK LOCATED AT 41-40.8N 64-59W

BT

18/2350Z

SKYLARK  
COMSUBLANT  
COMSUBFLOT 2

10 00210019 18

NNNN

D

X

Exhibit (13)

DXD889  
SX012  
OO RUEGXD  
DE RUEGXC 805  
ZNR

O 110430Z

FM NJOP

TO YZZF

OLDK

ORSI

BT

UNCLAS

SITREP ELEVEN

POSITIONING RECOVERY IN CENTER OF OIL SLICK AS DATUM.

CONSIDERING WIND AND CURRENT DRIFT AM COMMENCING PARALLEL

SEARCH FROM DATUM TO 10 MILES NORTH 1000 YDS BETWEEN PARALLELS

BT

11/0041Z

SKYLARK  
COMSUBLANT  
COMSUBFLOT 2

UNCLAS

Exhibit (14)

CSDA TWO

Holmes

M  
MH  
V  
Mars  
985  
20  
1087071

USS THRESHER (SSN 593)  
c/o Fleet Post Office  
New York, New York

SAILING LIST (Rev. 11 Mar 63)

Date of sailing 9 April 63

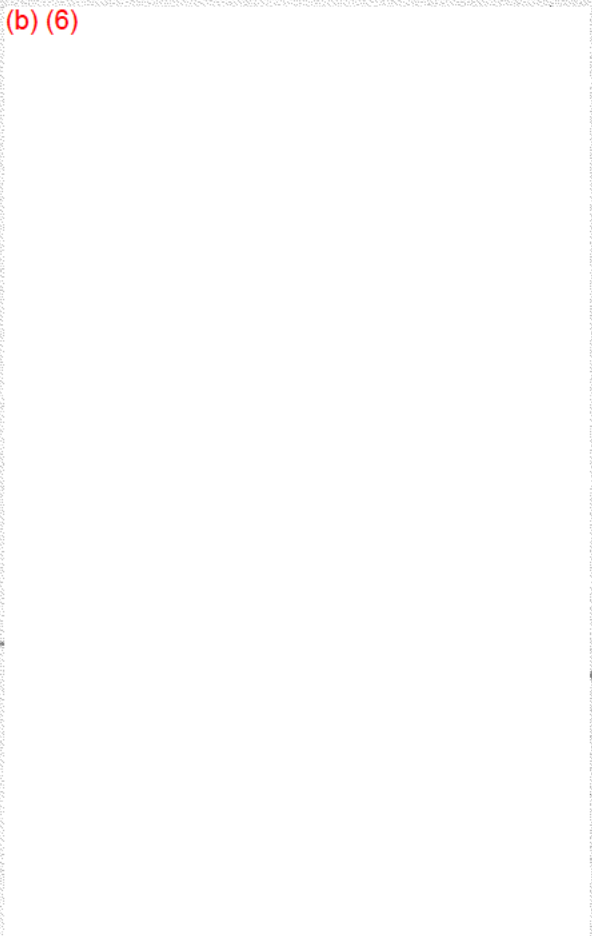
OFFICERS

HARVEY, John W.	LCDR
GARNER, Pat M.	LCDR
DI NOLA, Michael J.	LCDR
LYMAN, John S. Jr.	LT
SMARZ, John (n) Jr.	LT
<del>MC GOOLE, Raymond A.</del>	<del>LT</del>
PARSONS, Guy C. Jr.	LTJG
HENRY, James J. Jr.	LTJG
BABCOCK, Ronald C.	LTJG
WILEY, John J.	LTJG
MALINSKI, Frank J.	LTJG
Collier, M. F.	LT



ENLISTED

ARSENAULT, Tilmen J.	ENCA(SS)-P2
BAIN, Ronald E.	EN2(SS)-P2
BELL, John E.	MM1-P2
BOBBITT, Edgar S.	EM2(SS)-P2
BOSTER, Gerald C.	EM3(SS)-P1
BRACEY, George (n)	SD3(SS)
BRANN, Richard P.	EN2(SS)-P2
CARKOSKI, Richard J.	EN2(SS)
CAYEY, Steven G.	TM2(SS)
CHRISTIANSEN, Edward (n)	SN(SS)
CLAUSSEN, Larry W.	EM2(SS)-P2
CLEMENTS, Thomas E.	ETR3(SS)
CUMMINGS, Francis M.	SOS2'er
CARMODY, P. W.	SK2
DABRUZZI, Samuel J.	ETN2(SS)
DAY, Donald C.	EN3(SS)
DENNY, Roy O. Jr.	EM1(SS)-P2
<del>DESTEFANO, Frank J. Jr.</del>	<del>EM3A-P2</del>
DIBELLA, Peter J.	SN
DUNDAS, Don R.	ETN2(SS)
DYER, Troy E.	ET1(SS)-P1
DAVISON, III, Clyde E.	ETR3-P1
FORNI, Ellwood H.	SOCA(SS)-P1
FOTI, Raymond P.	ET1(SS)
FREEMAN, Larry W.	FTM2(SS)
FUSCO, Gregory J.	EM2(SS)-P2



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GALLANT, Andrew J.	HMCS(SS)-P2
GARCIA, Napoleon T.	SD1(SS)
GARNER, John E.	YNSN(SS)
GAYNOR, Robert W.	EN2(SS)
GOSNELL, Robert H.	SA(SS)
(b) (6)	<del>EM1(SS)-P1</del>
GRAHAM, William E.	SOC(SS)-P1
GUNTER, Aaron J.	QML(SS)
HALL, Richard C.	ETR2(SS)-P2
HAYES, Norman T.	EM1-P2
HEISER, Laird G.	MM1-P2
HELSIUS, Marvin T.	MM2
HEWITT, Leonard H.	EMCS(SS)-P2
HOAGUE, Joseph H.	TM2(SS)
HODGE, James P.	EM2
HUDSON, John F.	EN2(SS)
INGLIS, John P.	SN(SG)
JOHNSON, Brawner G.	FTG1(SS)-P2
JOHNSON, Edward A.	ENCA(SSO)
JOHNSON, Richard L.	RMSA
JOHNSON, Robert E.	TMC(SS)-P1
JOHNSON, Thomas B.	EFL(SS)-P2
JONES, Richard W.	EM2(SS)
KALUZA, Edmund J.	SOS2(SS)-P1
KANTZ, Thomas C.	ETR2(SS)
KEARNEY, Robert D.	MM3
KEILER, Donald D.	IC2(SS)-P2
KIESECKER, George J.	MM2(SS)-P2
KLIER, Billy M.	EN1(SS)-P2
KRONER, George R.	CS3
LANNQUETTE, Norman G.	QML(SS)
(b) (6)	<del>EM2(SS)</del>
LAVOIE, Wayne W.	YN1(SS)
MABRY, Templeman N	EN2(SS)-P2
MANN, Richard H. Jr.	IC2(SS)
MARULLO, Julius F. Jr.	QML(SS)
(b) (6)	<del>TM2(SS)</del>
MC CLELLAND, Douglas R.	EM2(SS)
MC CORD, Donald J.	MM1(SS)-P2
MC DONOUGH, Karl P.	TM3(SS)
MIDDLETON Sidney L.	MM1(SS)-P2
MUISE, Ronald A.	CS2
MUSSELWHITE, James A.	ETN2(SS)-P2

(b) (6)

TRANS

TRANS

Sched

SAILING LIST (Rev. 11 Mar 63) Con't

HAULT, Donald E.	CS1(SS)
HOONIS, Walter J.	RMC(SS)
NORRIS, John D.	ETL(SS)-P2
OTTING, Chesley C.	EM2-P2
<del>(b) (6)</del>	<del>EM1(SS)-P2</del>
PENNINGTON, Roscoe C.	EMCA(SS)-P2
PETERS, James G.	EMCS-P2
PHILLIPPI, James G.	SOS2(SS)
PHILPUT, Dan A.	EN2(SS)-P2
PODWELL, Richard (n)	MM2-P2
REGAN, John S.	MM1(SS)-P2
RITCHIE, James P.	RM2
ROBINSON, Pervis (n)	SN
ROENTREE, Glenn A.	QM2(SS)
RUSHETSKI, Anthony A.	ETN2
SINNET, Alan D.	FTG 2(SS)
SCHIEWE, James M.	EM1(SS)-P2
SHAFFER, Benjamin N.	EMCM(SS)-P2
SHAFFER, John D.	EMCS(SS)-P2
SHIMKO, Joseph T.	MM1-P2
SHOTWELL, Burnett M.	ETRSN
SMITH, William H. Jr.	BTL-P2
SOLOMON, Ronald H.	EM1-P2
STEINEL, Robert E.	SOL(SS)-P1
SWIDER, J.L.	MM1-P2
VAN PELT, Rodger E.	IC1(SS)-P2
WASEL, D. A.	RMSN
WALSKI, Joseph A.	RMI(SS)-P1
<del>(b) (6)</del>	<del>IG2(SS)-P2</del>
WIGGINS Charles L.	FTG1-P2
WISE, Donald E.	MMCA(SS)-P2
WOLFE, Ronald E.	QMSN(SS)
ZWEIFEL, Jay, H.	EM2-P1
GRAFFIN, J. F.	LTJG, (b) (6)

(b) (6)

TRAUSE

BOOK HELD BY COMSUBANT(ADMIN) PORTSMOUTH.

(b) (6)

F. H. GARNER LCDR, USN, EXEC. OFF.



USA RESUME (95(a)59) SAILING LIST

98  
12

PERSONNEL & CLEARANCE

TEL. NO.

NEXT OF KIN

DESIGN DIVISION

ALLEN, LCDR Philip H. ①

(b) (6)

Code 241D

(b) (6)

(b) (6)

North Hampton, N.H.

(b) (6)

1  
PREFSCOTT, Robert D. (on Board)

(b) (6)

~~Code 246~~

(b) (6)

Sanford, Me. (b) (6)

2  
SHARON, Robert A.

(b) (6)

Code 246

(b) (6)

Newburyport, Mass. (b) (6)

3  
GUERETTE, Paul A.

(b) (6)

Code 261

(b) (6)

(b) (6) Portsmouth, N. H.

4  
FISHER, Richard K.

(b) (6)

Code 246

(b) (6)

Durham, N. H. (b) (6)

PLANNING & ESTIMATING DIVISION

BILLINGS, LCDR John H. ②

(b) (6)

Code 213

(b) (6)

South Berwick, Me. (b) (6)

COMBAT SYSTEMS DIVISION

5  
WHITTEN, Laurence E.

(b) (6)

(b) (6)

(b) (6) Northwood, N. H.

(b) (6)

COMBAT SYSTEMS DIVISION (Cont'd)

6 BEAL, Daniel W., Jr.

(b) (6)

(b) (6)

(b) (6)

Somerset, N. H. (b) (6)

7 DES JARDINS, Richard R.

(b) (6)

(b) (6)

(b) (6) Kittery, Ma.

SPERRY REPRESENTATIVE

8 K. R. CORCORAN

(b) (6)

(b) (6)

Charlottesville, Virginia (b) (6)

COMBAT SYSTEMS DIV. CONTRACTORS

9 SAOUAY MAURICE F.

(b) (6)

Raytheon representative

(b) (6)

(b) (6)

Middletown, R. I.

10 KEUSTER, D.

Sperry Representative

(b) (6)

W. Hyattsville, Md.

11 STADTMULLER, D.

Sperry Representative

(b) (6)

Flower Hill, Roslyn, N. Y.

PRODUCTION DEPARTMENT

BIBERMAN, LT Robert J. 3

(b) (6)

Code 313

(b) (6)

Hampton, N. H. (b) (6)

CRITCHLEY, Kenneth J.

(b) (6)

Code 340A

(b) (6)

Dodgeford, Mo. (b) (6)

(b) (6)

STANDARD & GARDNER

11/11/54

LIST OF VETS

13

CITIZEN, Paul G.

(b) (6)

[Redacted]

(b) (6)

(b) (6)

Exeter, N. H.

14

ALLEN, Fred T.

(b) (6)

[Redacted]

(b) (6)

Kittery, Me. (b) (6)

15

FRANK, Franklin J.

(b) (6)

[Redacted]

(b) (6)

(b) (6) Durham, N.H.

16

BISHOP, George J.

(b) (6)

[Redacted]

(b) (6)

Bridford, Me.

17

(b) (6)

[Redacted]

*X scratched*

(b) (6)

[Redacted]

18

MOREAU, Henry

(b) (6)

[Redacted]

(b) (6)

[Redacted]

Mrs R WODA MOREAU (WIFE)  
Ridgeway Court  
Portsmouth, N.H.

LCDR ROBT. L. KRAG

(b) (6)

[Redacted]

1287 CONFIDENTIAL

(b) (6)

[Redacted]

Newbury, Conn

①



U. Q. C  
LOG.

Record

EX. 16 - 27/2/80

9 April - 1963

Time	From	To	Message
1015	Wavelub	Dip-Ser	Guntrude Check
	Dip-ser	Wavelub	Lead + clear
1035	DIP-SER	WAR CLUB	GUATAUDE CHECK.
1044	WAR CLUB	DIP-SER	MIKE CORPEN 125 MIKE SPEED 5
1045	DIP-SER	WAR CLUB	ROVER YOUR LAST HAVE YOU IN SIGHT
1047	WAR CLUB	DIP-SER	GUATAUDE CHECK
1048	DIP SER	WAR CLUB	READ YOU GOOD
1048	WAR CLUB	DIP-SER	MIKE CORPEN 125 MIKE SPEED 5
1048	WAR CLUB	DIP SER	REQUEST YOU CIRCLE ME AT 3000-4000 YDS WHILE YOU TEST SONAR
1048	DIP-SER	WAR CLUB	BE WISE CIRCLE TO THE LEFT
1050	DIP SER	WAR CLUB	ROVER YOUR LAST
1052	WAR CLUB	DIP-SIERRA	INT YOUR TURNS
1053	DIP SIERRA	WAR CLUB	73 RPMs
1054	DIP-SIERRA	Wavelub	78 RPMs
1008	WAR CLUB	DIP-SIERRA	MIKE SPEED 10
1013	DIP SER	WAR CLUB	REPEAT LAST TRANSMISSION
1014	DIP SIERRA	WAR CLUB	REPEAT LAST TRANSMISSION
1015	WAR CLUB	DIP SIERRA	MIKE CORPEN 080
1015	WAR CLUB	DIP SIERRA	MIKE SPEED "0"
1132	DIP SIERRA	WAR CLUB	DO YOU STILL DESIRE THAT I CIRCLE YOU?
1133	WAR CLUB	DIP SIERRA	There is a discoloration in water am proceeding to investigate
1137	Dip Sierra	Wavelub	Roar out
	DIP SIERRA	Wavelub	water discoloration 200yds ahead of me did you discharge anything astern of you

EXHIBIT 16

9 April 1963

Time	From	To	
1137	Dipserclub	Dip Ser via	Negative
1155	WARclub	Dip Ser via	The Extent of your investigation
1156	Dip Ser via	WARclub	Investigation shows water discoloration, shows some apparent subsy discharge when we pass through it caused bubbly effect on surface.
1157	WARclub	Dip Ser via	MIKE CORPIN 310 SPEED 5
1205	WARclub	Dip Ser via	WE ARE GOIN MAX. SPEED AHEAD WE WILL BE MAX. MAY. SPEED AHEAD + ASTERN
1206	Dip SER	WARclub	ROGER OUT
1220	WARclub	Dip SER.	MIKE CORPIN 090
1220	Dip SER.	WARclub	ROGER OUT
1224	WARclub	Dip SER.	ENTAND TO MAKE ENETIAL TREN DIVE ON THIS COURSE IN ABOUT 5 MIN.
1225	Dip SER	WARclub	ROGER OUT
1242	WARclub	Dip SER.	I AM DIVING TO PARSCOPE DEPTH
1242	Dip SER	WARclub	ROGER OUT
1245	WARclub	Dip SER	MIKE CORPIN 114
"	Dip SER	WARclub	UNDER STAND MIKE CORPIN 114 ROGER OUT

Time	From	To	Message
1257	WARClub	DipSir	RANGE CHECK
1258	DipSir	WARClub	JULIET TANGO 3,2 MY GADGET INDICATES JULIETTANGO 26
1259	WARClub	DipSir	THANK YOU ROGER OUT
1328	WARClub	DipSir	GERTRUDE CHECK
"	DipSir	WARClub	READ YOU LOUD + CLEAR
"	WARClub	DipSir	ROGER OUT
1329	WARClub	DipSir	REQUEST YOU HOLD ME TO 5000 YDS NORTH
"	DipSir	WARClub	ROGER OUT
1349	DipSir	WARClub	HAVE CONTACT BEARING 135 2,000 YD FROM ME
1346	WARClub	DipSir	CHANGE COURSE 180
"	DipSir	WARClub	ROGER OUT
1353	DipSir	WARClub	REQUEST STA.
"	WARClub	DipSir	2,000 YD OF MY STB BEAM
"	DipSir	WARClub	ROGER OUT
1357	WARClub	DipSir	MIKE COPPEN 114 MIKE SPEED 5
1357	DipSir	WARClub	ROGER OUT
1404	WARClub	DipSir	WE ARE PREPARING TO SURFACE
"	DipSir	WARClub	ROGER OUT
"	WARClub	DipSir	STANDBY TO ROUT MESS. FOLLOW
1405	DipSir	WARClub	ROGER OUT
1415	WARClub	DipSir	FROM USS THUNDER TO USS SKYMARK ON ROUTINE DAY TIME GR 091735Z BREA UN CLASS EXHIBIT 16 4



TIME	FROM	TO	MESSAGE
			CHANGE 101200Z RONDIVUE POINT TO RONDIVUE POINT 20 MILES EAST OF ORIGINAL RONDIVUE POINT FOR 101200Z BREAK OVER ROGER OUT
1406	DIPSER	WARCLUB	
1421	WARCLUB	DIPSER	MIKE SPEED 16
"	DIPSER	WARCLUB	ROGER OUT
1425	DIPSER	WARCLUB	PROCEEDING TO RONDIVUE POINT
"	WARCLUB	DIPSER	SEE YOU THERE

10 APRIL 1963  
Radio Check  
OVER

CLASSIFIED →

	WARCLUB	DIPSERIA	OVER
0745	WARCLUB	DIPSERIA	2000 Hold you 147° AT 3400 YDS
0745	DIPSERIA	WARCLUB	ROGER AND OUT
0747	WARCLUB	DIPSERIA	STARTING DEEP DIVE
0747	DIPSERIA	WARCLUB	ROGER
0748	DIPSERIA	WARCLUB	DIPSERIA WILL BE MAKING 10 TO 20 RPM TO MAINTAIN STERILE WAY
0749	WARCLUB	DIPSERIA	OKAY TO MANEUVER AS LONG AS YOU REMAIN IN PRESENT POSITION
0750	DIPSERIA	WARCLUB	REQUEST GIRTRUDE CHECK EVERY FIFTEEN MINUTES
0750	WARCLUB	DIPSERIA	ROGER AND OUT
0752	WARCLUB	DIPSERIA	AT 400 FT CHECKING FOR LEAKS
0752	DIPSERIA	WARCLUB	ROGER OUT

EXHIBIT 16  
5

TIME	FROM	TO	MESSAGE
0754 R	WARCLUB	PIPSERRIA	MY FUTURE REFERENCE TO MY DEPTH WILL BE MY TEST DEPTH
0754	PIPSERRIA	WARCLUB	ROGER OUT
0800	WC	DIAC	MY CSE 190
0801	DIPS	WC	ROUT
	DIPS	WC	CORPIN 70
0809	WC	DIPS	ROUT
	DIPS	WC	AM PROCEEDING 1/2 SET DISTANCE
0815	WC	DIPS	ROUT
	DIPS	WC	CORPIN 10
0819	WC	DIPS	ROUT
	DIPS	WC	CORPIN 090
0824	WC	DIPS	ROUT
	DIPS	WC	CORPIN 180
0835	WC	DIPS	ROUT
	DIPS	WC	PROCEEDING TO TEST DEPTH - 300
0842	WC	DIPS	ROUT
	DIPS	WC	CORPIN 270
0843	WC	DIPS	ROUT
	DIPS	WC	CORPIN 000
0853	WC	DIPS	ROUT
	DIPS	WC	PROCEEDING TO TEST DEPTH
0902	WC	DIPS	ROUT
	DIPS	WC	CORPIN 090 (?)
0910	WC	DIPS	SAY AGAIN
0912	WC	DIPS	Derhuda check 10
	DIPS	WC	K
	WC	DIPS	K
	DIPS	WC	HAVE POSITIVE UP ANGLE - ATTEMPTING

0914	WC	DIPS	R OUT
	WC	DIPS	NO CONTACTS IN AREA
0915	WC	DIPS	MY COR PIN 270 INT R-15 FU 4?
	<del>WC</del>	<del>DIPS</del>	R UN CONTROL
0917	WC	WC	900M (?)
0920	WC	DIPS	RDO CK
0927	WC	DIPS	K
0931	WC	DIPS	K
			(RDO CK EVERY 60 SECS - UNABLE TO PAGE WAR CLUB)
0932	WC	DIPS	K
0933	WC	DIPS	K
0934	WC	DIPS	K
0935	WC	DIPS	K
0936	WC	DIPS	Rdo ck K
0937	WC	DIPS	K
0938	WC	DIPS	K
0939	WC	DIPS	K
0940	WC	DIPS	X
0941	WC	DIPS	ldo ck K
0942	WC	DIPS	K
0943	WC	DIPS	K
0944	WC	DIPS	K
0945	WC	DIPS	K
0946	WC	DIPS	Rdo ck K
0947	WC	DIPS	Rdo ck K
0948	WC	DIPS	K
0949	WC	DIPS	K
0950	WC	DIPS	Rdo ck K

0951	WC	Dips	Rdo Chk
0952	WC	Dips	K
0953	WC	Dips	K
0954	WC	Dips	Rdo Chk
0955	WC	Dips	Rdo Chk
0956	WC	Dips	Rdo Chk
0957	WC	Dips	Rdo Chk
0958	WC	Dips	Rdo Chk
0959	WC	Dips	Rdo Chk
1000	WC	Dips	Rdo Chk
1001	WC	Dips	Rdo Chk
1002	WC	Dips	Rdo Chk
1003	WC	Dips	Rdo Chk
1004	WC	Dips	Rdo Chk
1005	WC	Dips	Rdo Chk
1006	WC	Dips	CW <sup>Transmit</sup> Q. Q. Q. K
1007	WC	Dips	K
1009	NADQ	NJDF	QQQ K
1010	WC	Dips	Rdo Chk
1011	NADQ	NJDF	QQQ K
1012	WC	Dips	Rdo Chk
1013	NADQ	NJDF	QQQ K
1014	WC	Dips	Rdo Chk
1015	NADQ	Dips	QQQ K
1016	WC	Dips	Rdo Chk
1017	NADQ	NJDF	QQQ K
1018	WC	Dips	Rdo Chk
1019	NADQ	NJDF	QQQ K
1020	WC	Dips	Rdo Chk

1021	WADD	NJOF	QQQ K
1022	WC	Dips	Rdo ck k
1023	NADQ	NJOF	QQQ K
1024	WC	Dips	Rdo ck k
1025	NADQ	NJOF	QQQ K
1026	WC	Dips	Rdo ck k
1027	NADQ	NJOF	QQQ K
1028	WC	Dips	Rdo ck k
1029	NADQ	NJOF	QQQ K
1030	WC	Dips	Rdo ck k
1031	NADQ	NJOF	QQQ K
1032	WC	Dips	Rdo ck k
1033	NADQ	NJOF	QQQ K
1034	WC	Dips	Rdo ck k
1035	NADQ	NJOF	QQQ K
1036	WC	Dips	Rdo ck k
1037	NADQ	NJOF	QQQ K
1038	WC	Dips	Rdo ck k
1039	NADQ	NJOF	QQQ K
1040	WC	Dips	Rdo ck k UA
1041	WC	Dips	Rdo ck k
1044	NADQ	NJOF	QQQ K
1045	WC	Dips	Rdo ck k
(intermittent)	Note		VOC fails to transmit on CW
1048	WC	Dips	Rdo ck k
1050	NADQ	NJOF	QQQ K
1052	WC	Dips	Rdo ck k
1053	NADQ	NJOF	QQQ K
1055	WC	Dips	Rdo ck k

1057	NADQ	NJOF	OOQ k
1100	WC	Dips	Indicate your posit <sup>n</sup> or prepare to surface. Acknowledge within 10 minutes or will initiate, submit
1106	WC	Dips	"
1108	NADQ	NJOF	"
1115	WC	Dips	"
1121	NADQ	NJOF	Indicate your posit <sup>n</sup> or prepare to surface. Acknowledge initiating event. submit BT k
1122	WC	Dips	Rdo Ck k
1125	WC	Dips	Rdo Ck k
1126	WC	Dips	Rdo Ck k
1129	WC	Dips	Have <del>submitted</del> <sup>initiated</sup> submit - Ask indicate your position. ACK k
1131	WC	Dips	k
1132	WC	Dips	Rdo Ck k
1134	NADQ	NJOF	Have initiated ETC k
1140	WC	Dips	kdo Ck k
1145	WC	Dips	Rdo Ck k
1147	WC	Dips	Rdo Ck k
1149	NADQ	NJOF	Q&Q k
1151	WC	Dips	Rdo Ck k
1153	WC	Dips	Rdo Ck k
1155	NADQ	NJOF	OOQ k
1157	WC	Dips	Rdo Ck k
1159	WC	Dips	Rdo Ck k
1201	NADQ	NJOF	Q&Q k
1209	WC	Dips	SAME DS 1129

1210	NADQ	NSOF	QQQ K
1211	W/C	DIPS	SAME AS 1217
1216	NADQ	NSOF	QQQ K
1217	W/C	DIPS	HAVE INITIATED. Submiss indicate YOUR POSITION. ACK. OVER
1220	NADQ	NSOF	QQQ K
1222	W/C	DIPS	SAME AS 1217R
1225	NADQ	NSOF	QQQ K
1228	W/C	DIPS	SAME AS 1217
1230	NADQ	NSOF	QQQ K
1232	W/C	DIPS	SAME AS 1217
1236	NADQ	NSOF	QQQ K
1238	W/C	DIPS	SAME AS 1217
1242	NADQ	NSOF	QQQ K
1244	W/C	DIPS	SAME AS 1217
1248	NADQ	NSOF	QQQ K
1250	W/C	DIPS	SAME AS 1217
1254	NADQ	NSOF	QQQ K
1256	W/C	DIPS	SAME AS 1217
1300	NADQ	NSOF	QQQ K
1302	W/C	DIPS	SAME AS 1217
1306	NADQ	NSOF	QQQ K
1308	W/C	DIPS	SAME AS 1217
1312	NADQ	NSOF	QQQ K
1314	W/C	DIPS	SAME AS 1217
1318	W/C	DIPS	SAME AS 1217
1322	NADQ	NSOF	QQQ K
1324	W/C	DIPS	SAME AS 1217
1326	NADQ	NSOF	QQQ K

1330	W/C	Dips	SAME AS 1217
1332	NADQ	NSOF	QQQK
1336	W/C	Dips	SAME AS 1217
1338	NADQ	NSOF	QQQK
1342	W/C	Dips	SAME AS 1217
1344	NADQ	NSOF	QQQK
1348	W/C	Dips	SAME AS 1217
1350	NADQ	NSOF	QQQK
1354	W/C	Dips	SAME AS 1217
1356	NADQ	NSOF	QQQK
1408	W/C	Dips	SAME AS 1217
1415	NADQ	NSOF	QQQK
1418	W/C	Dips	SAME AS 1217
1422	NADQ	NSOF	QQQK
1424	W/C	Dips	SAME AS 1217
1428	NADQ	NSOF	QQQK
1480	W/C	Dips	SAME AS 1217
1435	NADQ	NSOF	QQQK
1437	W/C	Dips	SAME AS 1217
1447	NADQ	NSOF	QQQK
1449	W/C	Dips	SAME AS 1217
1454	NADQ	NSOF	QQQK
1459	W/C	Dips	SAME AS 1217
1501	NADQ	NSOF	QQQK
1505	W/C	Dips	SAME AS 1217
1507	NADQ	NSOF	QQQK
1511	W/C	Dips	SAME AS 1217
1514	NADQ	NSOF	QQQK
1516	W/C	Dips	SAME AS 1217
1520	NADQ	NSOF	QQQK



1524	WC	Dips	have initiated Submiss indicate your position acknowledge over
1526	NADQ	NSOF	QQQ K
1530	WC	Dips	SAME AS 1524
1532	NADQ	NSOF	QQQ K
1534	WC	Dips	SAME AS 1524
1538	NADQ	NSOF	QQQ K
1542	WC	Dips	SAME AS 1524
1543	WC	Dips	SAME AS 1524
1545	NADQ	NSOF	QQQ K
1547	WC	Dips	SAME AS 1524
1550	NADQ	NSOF	QQQ K
1552	WC	Dips	SAME AS 1524
1556	NADQ	NSOF	QQQ K
1600	WC	Dips	SAME AS 1524
1602	NADQ	NSOF	QQQ K
1606	WC	Dips	SAME AS 1524
1608	NADQ	NSOF	QQQ K
1610	WC	Dips	SAME AS 1524
1614	NADQ	NSOF	QQQ K
1617	WC	Dips	SAME AS 1524
1620	NADQ	NSOF	QQQ K
1622	WC	Dips	SAME AS 1524
1624	NADQ	NSOF	QQQ K
1628	WC	Dips	SAME AS 1524
1630	NADQ	NSOF	QQQ K
1632	WC	Dips	SAME AS 1524
<del>1700</del>	WC	Dips	"
1704	NADQ	NSOF	Event Submiss - surface surface k
1704	WC	Dips	same as usual

UHF LOG

1646	W4	Dips	270 11000 4J5 FM ME UT (b)(1) 60.9 (b)(1) W 127 K
1648	Dips	W4	You were cut out - in a 270 K int ORK K
1650	W4	Dips	Read you chas w/ intermittent garble K int 63.4 by last?
1655	W4	Dips	K (we call on another but no contact) (W4)
1710	CJ	Dips	K
1712	CJ	Dips	K
1720	Dips	CJ	proceed this area (visual)
1727	W4	Dips	CJ has sited on slide K
1728	W4	Dips	" "
1739	W5	Dips	read u Ork 5 int Ork K
1740	Dips	W5	Ork 5 - 205 while I pass on freq to W4 R out
42	W5		OUT ON SECTOR SEARCH
1802			sighted light
2229Z	W10		conducting sector search (W5 - SE SECTOR W4 - NE SECTOR)
1912	CJ	Dips	req. u li to & will conduct search according to possible drift K
	Dips	CJ	ROUT
1925	CJ	Dips	Commence calling WC on 2150 Kcs every 5 minutes
1926	Dips	CJ	R out
1927	Dips	Dips	station at datum request you conduct a parallel search to North east + West of datum W in either side of CJ
		W5	ROUT

W. O. C.

25

1716	WC	Dips	have initiated submit & indicate your posit. Acknowledge K
1720	NADO	HJOF	event submit surface surface
1725	WC	Dips	same as 1716
1724	WC	Dips	same as 1716
1729	WC	Dips	" "
1730	WC	Dips	" "
1731	WC	Dips	" "
1732	WC	Dips	" "
1733	WC	Dips	" "
1735	NADO	HJOF	Event submit - surface surface acknowledge K
1737	WC	Dips	same as 1716
1738	NADO	HJOF	same as 1735
1802	WC		still putting of some low mass
1855	WC	Dips	if you hear and generate wind, release air
1835	WC	Dips	(still keeping constant weight) " "
2045			" " (CW & VOICE)
2235	WC	Dips	same as 1635
2237	WC	Dips	same as 2235
2239	WC	Dips	same as 2237
2243	WC	Dips	same as 2239
2246	WC	Dips	same as 2243
2249	WC	Dips	same as 2246
2251	WC	Dips	same as 2249
2254	WC	Dips	same as 2251
2257	WC	Dips	same as 2254
2302	WC	Dips	same as 2257

EXHIBIT 16  
15

UHF			
1935	Dips WS	WS	R U datum?
1937	Dips WS	Dips WS	Neg - datum SE To Uo, water NK
1938	Dips	WS	Commencing search at this time
1939	Dips	Dips	R out
2000	Dips	WS	2 MERSHIPS sighted - investigated & returned to search
		Dips	R out
		CJ	FRM W 10 HAS COMP SEARCH IN SEC 1 NUM SMALL TROLE R CONT NO OTHER CONTACTS TO U WITH ME TO STAY ON STAT
2012	CJ	DIPS	T W 10 HOW MUCH LONGER STAY ON STAT
	DIPS	WS	TILL 0329 Z
2014	DIPS	WS	FULL 0330 Z
2017	DIPS	WS TH	COND PARR 5 FT FROM DATUM TO SOUTH 20 FT FAR 10 FT EAST & W OF DATUM TO SOUTH
2025	Dips	CJ	am going to put small boat in water at first tide to look for further debris do you have any further instructions?
2027	CJ	Dips	Concur K
2050	Dips WS	WS	conditions undesirable for visual search
2051	Dips	WS	R - conduct electronic + visual search
2052	Dips WS	WS	R out
			I WILL RELAY UHF 12
			T CJ - on their way results by 4 pm

EXHIBIT 16

UCL

2305	W.C	Dips	Same as 2302
2308	W.C	Dip	Same as 2305
2311	W.C	Dip	Same as 2308
2314	W.C	Dips	Same as 2311
2316	W.C	Dips	Same as 2314
2319	W.C	Dip	Same as 2316
2323	W.C	Dip	Same as 2319
2326	W.C	Dip	If you hear me generate noise release air & voice
2328	W.C	Dip	Same as 2326
2331	W.C	Dip	Same as 2328
2333	W.C	Dip	Same as 2331
2335	W.C	Dip	Same as 2333
2348	W.C	Dip	Same as 2335
2352	W.C	Dip	Same as 2348
2355	W.C	Dip	Same as 2352
2357	W.C	Dip	Same as 2355
0004	W.C	Dip	Same as 2357

11 April		1963	
0006	W.C	D.S.	Same as 0004
0010	W.C	D.S.	Same as 0006
0014	W.C	D.S.	Same as 0010
0017	W.C	D.S.	Same as 0014
0021	W.C	D.S.	Same as 0017
0023	W.C	D.S.	Same as 0021
0026	W.C	D.S.	Same as 0023
0030	W.C	D.S.	Same as 0026

UHF

272.8

	Dips	W5	FACT NEG R
	Dips	Dips	out
2137	Dips	W5	Finished my run to N-Results Neg-two
	W5	Dips	trawlers + two merchants
		10	out
			25 mi S of datum
			WSW E-W of datum
2159	W10	Dip Ser	Extent of time 2215
2200	Dip Ser	W10	You & All other aircraft
			are released thank you
			very much for your services
2205	W5	Dip Ser	Understand all aircraft
			are released want to
			COO Form Sorry we could
			be of no help. Returning
			home plate
2208	Dip Ser	W5	AFFermite Thank you for
			your services
	W275	Dip Ser	ON task till 0500Z
			will make any
	W275	Dip Ser	Quick draw requests
			present posit

EXHIBIT 16  
18

U.H.F

(b) (1)

	W 7 5		
2231	C. J	Dip Ser	Radio Check
2235	Dip Ser	C. J	Request posit my search inoperable
2340	W 12	DIP	Hughes 5 Victor with 2M relieving water 4 with your permission will release water 4 commence R. search 10 miles East + West of Datum to the south Max. Extent 20 miles of Datum
2343	DIP	W 12	
	DIP	W 12	Robert release
2340	W 12	DIP	Am standing by For instruction
0			INF surface C. trawler S. 308 11 Datum

13002

11 April 1963 U.H.F

0065	W. 12	Dip	For your INFO. my stay time in area 13002
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0014	W 12	Dip	Quick Draw Desires you contact him
------	------	-----	------------------------------------

0014	Dip Dip	W 12 Quick	Roger out Radio check neg
------	------------	---------------	------------------------------

0146	D.S.	C.J	Are you still in oil slick over.
	C.J	Dip S.	We cannot really tell we are trying to stay with it we will try to pick it up in the morning

	W 12	Dip S.	Completed search to south am commencing search another area
	Dip S	W 12	Conduct similar search to north of Datum



12 April 1963  
C. Q. C.

0034	W.C.	DIP	IF you hear me General Noise Release in CW. + Voice
0053	W.C.	DIP	Same as 0034
0057	W.C.	DIP	Same as 0053
0103	W.C.	DIP	Same as 0057
0106	W.C.	DIP	Same as 0103
0110	W.C.	DIP	Same as 0106
0120	Tidal W	D.S.	(UHF) My posit 41 34.5N 64 46.5W
	D.S.	Tidal W	(UHF) Rober out
0135	W.C.	DIP	Same as 0110
0140	W.C.	DIP	Same as 0135
0145	W.C.	DIP	Same as 0135
0150	W.C.	DIP	Same as 0145
0155	W.C.	DIP	Same as 0150
0200	W.C.	DIP	Same as 0155
0205	W.C.	DIP	Same as 0200
0210	W.C.	DIP	Same as 0205
0215	W.C.	DIP	Same as 0210
0220	W.C.	DIP	Same as 0215
0225	W.C.	DIP	Same as 0220
0230	W.C.	DIP	Same as 0225
0235	W.C.	DIP	Same as 0230
0240	W.C.	DIP.S	Same as 0235
0245	W.C.	DIP.S	Same as 0240
0250	W.C.	DIP.S	Same as 0245
0255	W.C.	DIP.S	Same as 0250
0300	W.C.	DIP.S	Same as 0255

11 APRIL 1963

U. Q. C.

0305	WARCWS	DIPPER SIERRA	IF YOU HEAR ME GENERATE NOISE. RELEASE AIR
0310	W.C.	DIP. S.	SAME AS 0305
<del>0315</del>	DIP. S.	W 12 (VHF)	COMPLETED SEARCH NORTH. AWAIT INSTRUCT.
0316	W 12	DIP. S.	REQUEST YOU SEARCH N + S OF DATUM 10M 1 EAST + WEST.
	<del>W 12</del> DIP. S.	W 12 (VHF)	ROGER. WILL START SEARCH SOUTH. OUT.
0320	W.C.	DIPPER SIERRA	IF YOU HEAR ME GENERATE NOISE. RELEASE AIR
0325	W.C.	D. S.	SAME AS 0320
0330	W.C.	D. S.	SAME AS 0325
0335	W.C.	D. S.	SAME AS 0330
0340	W.C.	D. S.	SAME AS 0335
0345	W.C.	D. S.	SAME AS BEFORE
0350	W.C.	D. S.	SAME AS BEFORE
0355	W.C.	D. S.	SAME AS BEFORE
0400	W.C.	D. S.	SAME AS BEFORE
0405	W-12	D. S. (VHF)	REQUEST YOU SHUT TO 243.0 MIL AIR
0410	W.C.	D. S.	IF YOU HEAR ME GENERATE NOISE RELEASE.
0415	W.C.	D. S.	SAME AS 0405
0419	QUICK D.	D. S. (VHF)	SIG. TO FOLLOW. EX. TO FLOW. TURN "9" EX.
0420	W.C.	D. S.	SAME AS BEFORE
0430	W.C.	D. S.	SAME AS BEFORE
0435	W.C.	D. S.	SAME AS BEFORE
0440	W.C.	D. S.	SAME AS BEFORE
0445	W.C.	D. S.	SAME AS BEFORE
0450	W.C.	D. S.	SAME AS BEFORE
0453	WC	D. S.	" " "
0457	WC	D. S.	" " "
0502	WARCWS	N. J. O. F.	Q. Q. Q. K.

# UHF

	Dupe	CJ	DO U HAVE ACFT I CAN TAKE BEARINGS ON THE DIT SLICK
		Dupe	R O U R
	BP d	Dupe	K
0517	BP4	Dupe	K (UNABLE TO MAKE CONTACT)
	CS	Dupe	REQ U TRY COMM W/ BP4 AS HE IS ACFT WORKING DESIRED AREA
0520	Dupe	C9	R O U T
0553	<del>BP9</del> Dips	BP9	Pdo ck k
	BP9	Dups	R O U
	WPS	BP9	OR WEAK W/LOUD BACKGROUND
0956	BP9	Dups	R O U T
	WPS	DIPS	SAY AGIN
0708		HG5	WHICH SHIP IS AT DATUM
		DIPS	WAIT
		DIPS	CJ IS ON DATUM
0710		HG5	R O U T

0507	WARClub	DIPPER S.	IF YOU HEAR ME GENERATE NOISE; RELEASE #11
0514	NADQ	NJOF	Q Q Q K
0515	NADQ	NJOF	EVENT SUBMISS - SURFACE - ACK K
0527	WC	DIPS	SAME AS 0507
0531	WC	DIPS	SAME AS 0527
0533	NADQ	NJOF	SAME AS 0515
0538	WC	DIPS	SAME AS 0527
0541	NADQ	NJOF	Q Q Q K
0543	WC	DIPS	SAME AS 0507
0547	WC	DIPS	" " "
0550	NADQ	NJOF	SAME AS 0515
0559	WC	DIPS	SAME AS 0507
0603	NADQ	NJOF	SAME AS 0515
0608	WC	DIPS	SAME AS 0507
0612	NADQ	NJOF	SAME AS 0515
0618	WC	DIPS	SAME AS 0507
0625	WC	DIPS	SAME AS 0507
0629	NADQ	NJOF	SAME AS <del>0515</del>
0632	WC	DIPS	SAME AS 0507
0636	WC	DIPS	" " "
0640	NADQ	NJOF	SAME AS 0515
0645	WC	DIPS	SAME AS 0507
0652	NADQ	NJOF	Q Q Q K
0655	WC	DIPS	SAME AS 0507
0700	WC	DIPS	" " "
0702	NADQ	NJOF	Q Q Q K
0705	WC	DIPS	SAME AS 0507
0709	WC	DIPS	SAME AS 0705
0711	WC	DIPS	NADQ DE NJOF Q Q Q K

11 APRIL 1963

TIME	WAR CLUB	DIPPER SIERRA	IF YOU HEAR ME GENERATE NOISE, PLEASE A
0719	WAR CLUB	DIPPER SIERRA	IF YOU HEAR ME GENERATE NOISE, PLEASE A
0725	W.C.	D.S.	NIADQ DE NJOF QQQ K
0727	W.C.	D.S.	SAME AS 0719
0729	W.C.	D.S.	SAME AS 0725
0731	W.C.	D.S.	SAME AS 0719
0732	W.C.	D.S.	SAME AS 0725
0734	W.C.	D.S.	SAME AS 0719
0736	W.C.	D.S.	SAME AS 0726
0738	W.C.	D.S.	SAME AS 0719
0740	W.C.	D.S.	SAME AS 0725
0742	W.C.	D.S.	SAME AS 0725
0745	W.C.	D.S.	SAME AS 0725
0747	W.C.	D.S.	SAME AS 0719
0749	W.C.	D.S.	SAME AS 0725
0751	W.C.	D.S.	SAME AS 0719
0753	W.C.	D.S.	SAME AS 0725
0755	W.C.	D.S.	SAME AS 0719
0757	W.C.	D.S.	SAME AS 0725
0803	W.C.	D.S.	SAME AS 0719
0808	W.C.	D.S.	SAME AS 0725
0813	W.C.	D.S.	SAME AS 0719
0818	W.C.	D.S.	SAME AS 0725
0823	W.C.	D.S.	SAME AS 0719
0828	W.C.	D.S.	SAME AS 0725
0833	W.C.	D.S.	SAME AS 0719
0838	W.C.	D.S.	SAME AS 0725
0843	W.C.	D.S.	SAME AS 0719
0848	W.C.	D.S.	SAME AS 0725
0853	W.C.	D.S.	SAME AS 0719

EXHIBIT 16  
25

TIME			
0858	WAR CLUB	DIPPER SIERRA	NADQ DE NJOF QQQ K
0903	W.C.	D.S.	IF YOU HEAR ME GENERATE NOISE RELEASE AIR
0910	W.C.	D.S.	SAME AS 0858
0915	W.C.	D.S.	SAME AS 0903
0920	W.C.	D.S.	SAME AS 0858
0925	W.C.	D.S.	SAME AS 0903
0930	W.C.	D.S.	SAME AS 0858
0935	W.C.	D.S.	SAME AS 0903
0940	W.C.	D.S.	SAME AS 0858
0945	W.C.	D.S.	SAME AS 0903
0950	W.C.	D.S.	SAME AS 0858
0955	W.C.	D.S.	SAME AS 0903
1000	W.C.	D.S.	SAME AS 0858
1005	W.C.	D.S.	SAME AS 0903
1010	W.C.	D.S.	SAME AS 0858
1015	W.C.	D.S.	SAME AS 0903
1020	W.C.	D.S.	SAME AS 0858
1025	W.C.	D.S.	SAME AS 0903
1030	W.C.	D.S.	SAME AS 0858
1035	W.C.	D.S.	SAME AS 0903
1040	W.C.	D.S.	SAME AS 0858
1045	W.C.	D.S.	SAME AS 0903
1050	W.C.	D.S.	SAME AS 0858
1055	W.C.	D.S.	SAME AS 0903
1100	W.C.	D.S.	SAME AS 0858
1105	W.C.	D.S.	SAME AS 0903
1110	W.C.	D.S.	SAME AS 0858
1115	W.C.	D.S.	SAME AS 0903





EXHIBIT 17



EXHIBIT 18

Ex 17+18



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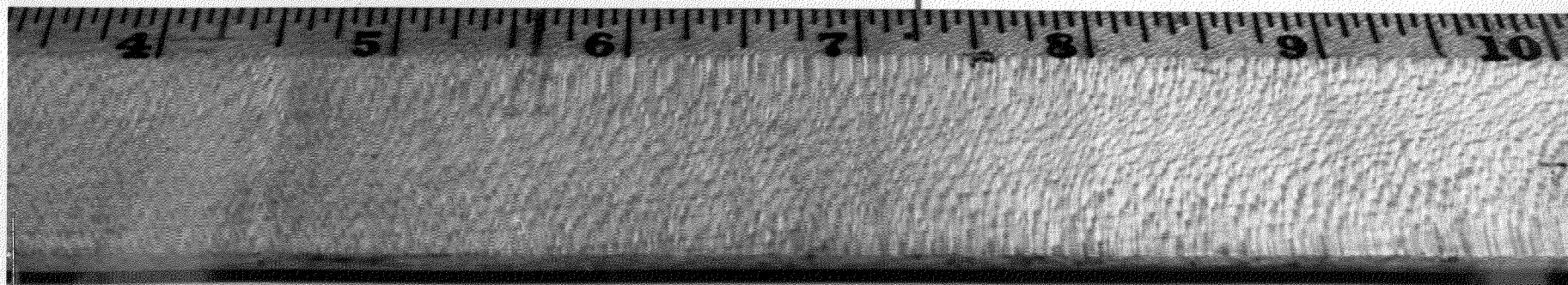
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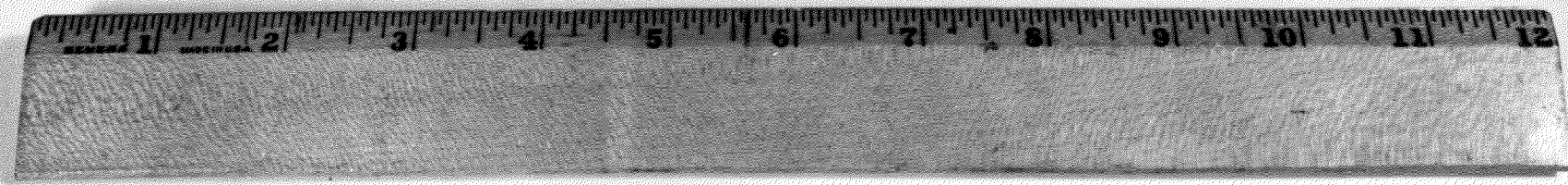
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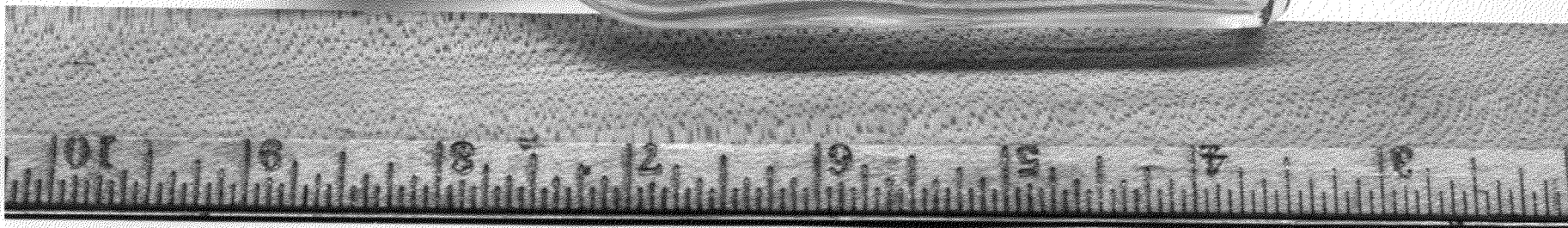
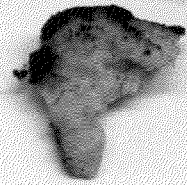
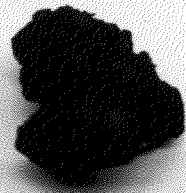
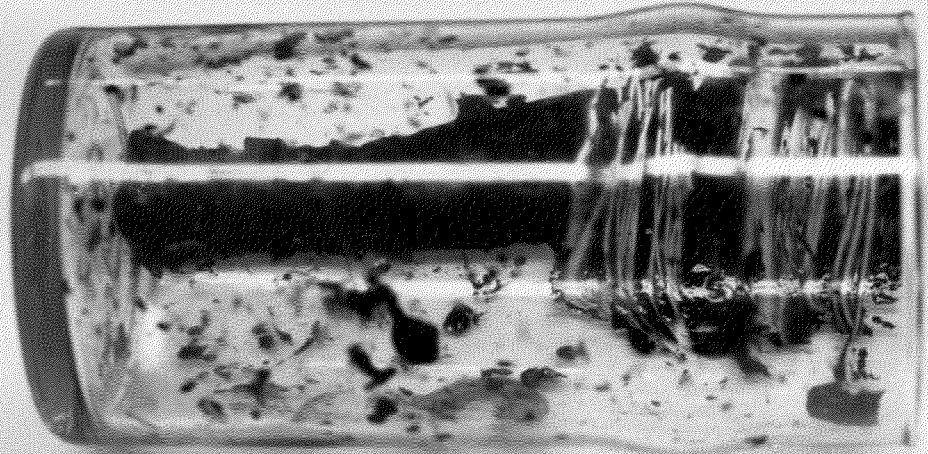
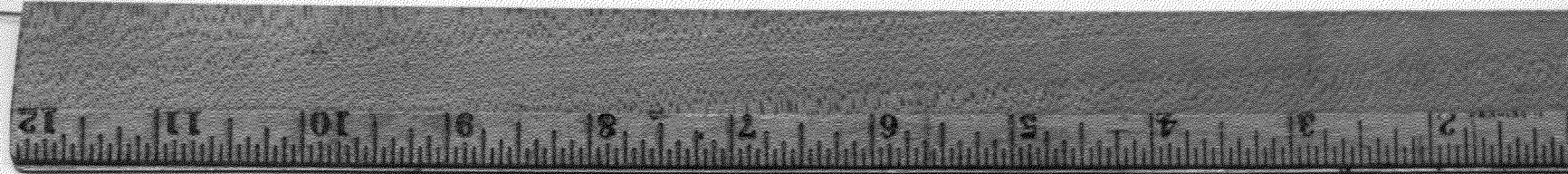


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